IN THIS ISSUE—TRACTOR SALES AND SERVICE

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The AUTOMOBILE

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No. 23

NEW YORK, JUNE 7, 1917

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Editorial Contents, page 3

Advertisers' Index—Next to last page

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Vol. XXXVI New York—Thursday, June 7, 1917—Chicago No. 23

Stanley To Boost Production

Reorganization With Increased Capital in Expansion—Warren Is President

NEWTON, MASS., June 4—The Stanley Motor Carriage Co., this city, undoubtedly the oldest automobile company in the world to manufacture cars in commercial quantities, has been re-organized with increased capital, and immediate steps are to be taken to increase its production of Stanley steam cars. The factory capacity is to be enlarged at once, more manufacturing equipment installed, and a strong modern merchandising organization built up. This re-organization does not mean that the Stanley company is going to bring out a cheap steam car, rumors of which have been frequent of late. Such are unfounded. The new organization announces that it will make no change in the models or the price.

Under the re-organization the existing Stanley Motor Carriage Co. has been taken over by the new Delaware corporation which is of the same name. The new capitalization includes $2,500,000 preferred stock and 100,000 shares common stock of no par value. The financial interests are represented by Counselman & Co., Chicago bankers.

Financial arrangements are complete and no public offering of stock will be made.

Under the re-organization, Prescott Warren, who has been connected with the organization as vice-president, becomes president. The other officers are: Carleton F. Stanley, vice-president; Frank Jay of Chicago, vice-president; Edward M. Hallett, treasurer; Wm. F. Garcelon, secretary; and the directorate includes the above with Charles Counselman and Arthur L. Goodwillie. Frank Jay has been western representative of the Stanley company for many years, handling wholesale and retail business from Chicago.

The Stanley company has been one of the picturesque organizations of the motor industry in America. The company has not followed many of the accepted policies of the industry, such as aggressive merchandising, yet the cars have been produced in commercial quantities for almost 20 years. No effort has been made during that time to get into quantity production. The original Stanley Motor Carriage Co. was founded in 1898 and incorporated in 1901 by F. E. and F. O. Stanley. Stanley cars were first built in the plant of the Stanley Dry Plate Co., which continued their manufacture until 1901. The Stanley car was manufactured in quantities in 1898, at which time a production of 200 was put through. The first Stanley cars were built in 1896.

In the early days of the automobile Stanley vehicles were conspicious in contests. Fifteen years ago the first automobile to climb Mt. Washington in the White Mountains was a Stanley, driven by F. O. Stanley. The first car to make a mile under 1 min. on an American race track was the Stanley. In 1906 the Stanley figured as a leader in Florida beach races, when a mile was covered in 28½ sec., a record which stood for 6 years.

—

Malay States Ban Automobile Imports

SINGAPORE, June 1—The importation of automobiles, traction engines, and parts thereof into the Federated Malay States has been prohibited, effective May 23, except under license. The prohibition on the importation of automobiles into the Straits Settlements and the duty of 10 per cent on automobiles in the Federated Malay States were recently announced in these columns.

Proposed Tax on Cars

List Price	Tax
$500 and under	$7.50
$500 to $1,000	10.00
$1,000 to $2,000	15.00
$2,000 to $3,000	20.00
$3,000 and over	25.00
Motorcycles	2.50

Reductions from list of 10 per cent a year for used cars.

Tax to be assessed July 1.

Owners' Tax Replaces 5% Levy

Senate Finance Committee Abandons Tax on Makers—$42,000,000 from Owners

WASHINGTON, June 5—A flat 1 per cent tax of the retail price of all automobiles to be paid by the car owner was considered to-day by the Senate Finance Committee as a substitute for the graduated tax tentatively agreed upon last week to replace the 5 per cent levy on manufacturers. This was proposed by Senator LaFollette in the form of an amendment to the war revenue bill and, like the graduated tax plan, provides for 10 per cent reduction each year for a period of 5 years.

Under Senator LaFollette's proposal every car owner would be taxed in proportion to the value of his car. For example, the owner of a new $500 car would pay a $5 tax and the owner of a $5,000 car would contribute $50 to the war revenue fund. If the $500 car were a year old the owner would pay only $4.50, and if the $5,000 car were 3 years old its tax would be only $36.45.

Judging from comments heard by members of the Senate Finance Committee after the conference to-day it is considered unlikely that Senator LaFollette's scheme will be adopted. Chairman Simmons of the committee stated that this plan would slightly increase the revenue from automobile owners.

The bill, as tentatively drawn, finally cut out the House tax of 5 per cent upon manufacturers and substitutes a tax upon automobile owners, ranging from $7.50 to $25. Reductions in the tax are made at the rate of 10 per cent for each year's use of cars up to 5 years, which makes the maximum allowance 50 per cent.

According to figures submitted by the Treasury Department, these taxes, not including trucks, would bring in approximately $42,000,000.

(*Continued on page* 1074)

Interchangeability in War Trucks

Engines and Transmission to Be So Arranged Due to Work of S. A. E.

WASHINGTON, June 3—It will be possible to have the military motor trucks, for which bids are now being opened, so constructed that the engines and transmissions will interchange from one vehicle to another. This is the decision arrived at as a result of a 2-day meeting of engine, transmission and complete motor truck manufacturers concluded tonight.

The details are not yet fully worked out, and weekly meetings will be held in Detroit or in Washington until the task is done. It is understood that sizes and strengths will be figured on the assumption that the class A truck has a capacity of 2½ tons, and the class B a capacity of 5 tons. In other words, the Society of Automotive Engineers considers the military trucks as specified suitable for these loads.

Agreement upon standardization of so wide a scope marks a stage of development far ahead of anything heretofore attained by the S. A. E.

—

Makers Buy Liberty Bonds

DETROIT, June 1—Detroit manufacturers assembled at the board of commerce last night subscribed to millions of dollars worth of Liberty Bonds. The Ford Motor Co., was the first and largest subscriber, taking $1,250,000 worth of bonds for its employees. The Cadillac Motor Car Co., the Detroit Copper & Brass Rolling Mills and the Maxwell Motor Co. each subscribed for $250,000 worth. The Continental Motors Corp., Detroit Steel Products Co., Timken-Detroit Axle Co., Chalmers Motor Co. and the Fisher Body Corp. each subscribed to $100,000. $50,000 subscriptions were made by the Hayes Mfg. Co., the Edmunds & Jones Co., the Russel Wheel & Foundry Co., General Aluminum & Brass Mfg. Co.

DETROIT, June 6—Henry Ford personally subscribed to $5,000,000 worth of Liberty bonds to-day and James Couzens subscribed to $2,000,000 worth. Dodge Bros. subscribed to $1,500,000 worth Monday. These subscriptions brought Detroit's total to the point of over-subscription by more than $2,500,000.

—

Mid-West Section S. A. E. Elects

CHICAGO, June 2—C. H. Whitney, sales engineer, Willard Storage Battery Co., was elected chairman of the Mid-West Section Society of Automotive Engineers at the regular quarterly meeting of the section at the Chicago Automobile Club last night. Whitney succeeds F. E. Place of the Buda Co., who automatically becomes vice-chairman, Darwin S. Hatch, editor *Motor Age*, was re-elected secretary, and George L. Lavery, western manager, West Steel Castings Co., was elected treasurer succeeding Charles W. Stiger, president of the Stromberg Motor Devices Co. As only one ticket was in the field, the elections were unanimous.

Darwin S. Hatch gave a synopsis of the recent editorial conference of associated business publications with members of the cabinet and the Council of National Defense at Washington.

—

Morgan Potter Enters Automobile and Truck Building Fields

BEACON, N. Y., June 5—The Morgan Potter Mfg. Co. is changing its name to the Morgan Potter Motor Co. and will devote its plant to the manufacture of a four-cylinder, five-passenger touring car, a light truck and truck converters. Morgan Potter, president of the company during its 30 years' experience as a carriage accessory maker, continues at the head of the business.

All products of the company will bear the name Beacon. The company expects to develop an extensive export trade with South Africa, Australia and South America.

—

Chalmers Brings Out New Models

Open and Closed Cars on 117-In. and 122-In. Chassis

DETROIT, June 6—The Chalmers Motor Co. is bringing out a complete new line of open and closed cars comprising a five-passenger touring car, four-passenger phaeton, a roadster and cabriolet on the 117-in. chassis and seven-passenger sedan, limousine-landau, town car, and town car landau on the 122 in. chassis. The Chalmers company now secures the bodies in the rough and completes them in its own factory. Appointments and finish of the new closed cars are much better than is common in cars of the Chalmers price class. The interior of the limousine-landau is finished in inlaid Georgian period silver finish hardware of Countess Shelburne design. Among the appointments are a concealed lady's vanity case and gentleman's smoking set, double domb lights, inlaid mahogany panels, etc. Appointments of the other closed cars follow closely those of the limousine-landau.

—

Buick to Raise Prices

FLINT, MICH., June 6—The Buick Motor Co. is informing its dealers that prices will be increased in the near future due to the increasing cost of materials and labor. The amount of increase has not yet been determined.

—

239 Reservations for S. A. E. Dinner

NEW YORK, June 7—Some 239 reservations have been made to date for the informal dinner to be held June 26 at the New Willard Hotel in Washington during the annual meeting of the Society of Automotive Engineers.

U. S. Motorized Field Battery

First Unit of Horseless Artillery—Early Substitution of Tractors for Horses

WASHINGTON, June 1—A fully motorized field battery has just been developed by the U. S. Army. This is believed to be the first complete unit of horseless artillery created. An early substitution of tractors for horses in handling nearly all forms of ordnance is predicted by army authorities.

The problem of eliminating the horse entirely from the work of dragging such guns as medium caliber types to the front is one on which both European and American engineers were working for years before the outbreak of the war. Successful experiments by the government authorities now seem to promise an early substitution of the machine for the horse in hauling nearly all forms of ordnance.

The experiments were carried on first with various types of tractors under the direction of the Field Artillery Board at Fort Sill, Okla., and by the Ordnance Dept. of the Army at Rock Island Arsenal. The tractor standards committee of the Society of Automotive Engineers was enlisted at the outbreak of the war and has been co-operating in the study of the problem.

The large howitzer types are sure to be motorized. The motorization of the light types, such as the French 75s, will have to wait for the development of tractors capable of developing a combination of speed for emergencies and pulling power in mud equal to that of horses.

European armies have already reduced greatly the number of horses in artillery use. The big creeping type tractors capable of handling the heaviest guns which have so far been used in Europe have been unable to meet the demand for making the occasional bursts of speed necessary for getting the light field guns into position and using the minimum of space which conditions on the firing line frequently make vital.

The new creeping or self-track-laying type of small or medium size developed by the American army are expected to take the places of horses. The development in this type in tractors powerful enough to haul the heaviest guns will make them entirely available for making the sharp turns and corners and fitting into the inconvenient spaces for which horses have so far had to be used at the very front.

—

1918 Lycoming Engines Nearly Ready

WILLIAMSPORT, PA., June 1—The Lycoming Foundry & Machine Co. expects to announce its 1918 motors at an early date. In THE AUTOMOBILE for April 12 was published the description of the Lycoming engine, which, however, is not the new model as was stated, but rather one which has been in production for some time.

Chicago U. S. Motor Market

All Army Equipment To Be Bought Through Chicago Quartermasters' Depot

CHICAGO, June 4—All motor vehicle equipment for the army is to be purchased through the Chicago depot of the Quartermasters' Corps. Col. A. D. Kniskern at the headquarters of the central department in Chicago is in charge of this work. The first bids, as mentioned in THE AUTOMOBILE 2 weeks ago, are to be opened June 8, others June 10 and still others June 11.

Bid on Own Specifications

Some manufacturers of motor trucks have been requested to submit bids on trucks according to the army specifications but it is understood from sources close to Quartermasters' headquarters that truck manufacturers should bid on their own specifications. Truck manufacturers should specify make of their units such as motors, gearset, axle, etc., and as a most important feature should state definitely just how many vehicles they are in a position to deliver per year and per day and the quantity and date of earliest possible deliveries without jeopardizing their commercial trade.

—

Horning Heads Tractor Board

WAUKESHA, WIS., June 2—Harry L. Horning, secretary, general manager and chief engineer of the Waukesha Motor Co., and one of the leading members of the S. A. E., announced to-day his acceptance of the offer of the government to take charge of the farm and ordnance tractor division of the committee advisory to the National Council of Defense and its division of war munitions and food control. Mr. Horning will make his headquarters at Washington.

—

Thomas Truck Goes to Schenectady

NEW YORK, June 4—The Thomas truck and the armored cars which Charles K. Thomas has produced in this city are to be produced in Schenectady in the old Mohawk Brewing plant. Both the Thomas Auto Truck Co. and the Armored Motor Car Co., which were founded by Thomas, have been taken over by the Consolidated Motors Corp., which also was formed by Thomas for the purpose of combining truck company properties. The Mohawk Brewing plant was secured by the Consolidated to provide a home for the combined companies. The vehicles will be continued substantially as heretofore.

—

Few Changes in Monitor

COLUMBUS, OHIO, June 2—The Monitor Motor Car Co., maker of Monitor roadsters and touring cars, is continuing its chassis with a few slight refinements. The chassis carrying the four-cylinder motor is of 110-in. wheelbase—2 in. longer than the former model. The six-cylinder chassis, in which a 7-W Red Seal Continental motor is used, has a 117-in. wheelbase.

The Tour-Four roadster body or the five-passenger touring car body are mounted on either a four or six-cylinder chassis.

Electric equipment consists of Heinze magneto, generator and starter. The starter is of double unit type, operating on flywheel through Bendix drive. Cooling in the four-cylinder models is thermosyphon, with 2-in. circulating pipes; in the six-cylinder models by pump circulation. The floating rear axle is Adams, with 1¼-in. 3½ per cent nickel steel shafts. Differential gears are Brown-Lips, 3½ per cent nickel steel. Roller bearings are Bower; thrust bearings Gurney.

The four-cylinder models list at $895; the six-cylinder models at $1,095.

HOWARD MARMON

Appointed Aircraft Engineering Engineer of the Aircraft Production Board

—

Rickenbacher to Drive for Pershing

WASHINGTON, June 6—Eddie Rickenbacher, well-known racing driver, has been appointed pilot of the private car of Major-General John J. Pershing for duty in France.

—

New Stewart-Warner Searchlight

CHICAGO, June 2—The Stewart-Warner Speedometer Corp. has brought out a new searchlight called the Stewart V-Ray. The lamp is water-and dirt-proof and has a focusing device of sufficient range to permit the use of all types of G-12 or G-16½ lamp bulbs of both vacuum or gas types, making replacement possible from other lamps on the car. A 3½-in. reducing mirror is fitted to the back of the lamp without extra charge. The outfit is finished in black enamel with nickel trimming, and sells for $5; price west of Rocky Mountains, $5.50.

Marmon Is Made Air Engine Chief

As Major in Signal Corps Will Head Four Departments Under Souther

WASHINGTON, June 5—Howard Marmon has come to Washington to locate for an indefinite time that he may give his sole attention to the work of assisting Major Henry Souther, head of the Aircraft Production Board, in the capacity of Aircraft Engineering Engineer. He will be commissioned a major in the Signal Corps in this capacity and will be in direct charge of aircraft engines for the Signal Corps, his division being one of four departments under Major Souther. The other departments are airplane engineer, experimental engineer and inspector of materials purchased for the Signal Corps.

The report that Mr. Marmon will go to France soon is without foundation. Last week it was reported that he had been called to Washington to take part in the motorization of field artillery, but this subsequently proved to be erroneous.

—

Detroit Automobile Factory Executives Study War Requirements

DETROIT, June 2—Executives from a number of the automobile factories met yesterday noon at the Detroit Athletic Club to discuss suitable specifications under which to manufacture supplies for the government and also the matter of the proposed motorization of the field artillery. Captain William E. Dunn, U. S. Field Artillery, now on duty in Detroit, told of experiments of the artillery board and predicted that the motorization of the field artillery would produce a saving in money and men. Captain Dunn stated that 5400 trucks would be needed within the next year for the army of 1,500,000 men which the government plans to send abroad. These would release for other service 4040 men and 54,000 horses. Two committees were appointed to investigate motorization and supply specifications and will report at a future meeting. One committee comprises J. G. Vincent, vice-president in charge of engineering of the Packard Motor Car Co., E. E. Hemp, chief engineer of the Denby Motor Truck Co., and Irving E. Rocamp, technical engineer for the King Motor Car Corp. This committee is in Washington. The local committee includes Lee Anderson, vice-president of the Hupp Motor Car Corp., Charles Denby, export manager for the Hupp-Motor Car Corp., D. C. Stanbrough, of the Packard Motor Car Co., and Theodore Barthell, of the King Motor Car Co.

—

Alden a Major of Ordnance

WASHINGTON, June 6—H. W. Alden, vice-president of the Timken-Detroit Axle Co., has been appointed a major in the Ordnance Department.

British Government Builds 10,000 Ford Farm Tractors

Bids Asked for Supply of Parts — Complete Machines Will Not Be Made in Any One Plant — Will Need 8000 Other Tractors from America

LONDON, May 22—The British government has opened bids for the supply of parts to build 10,000 tractors of a standardized design. The machine will be known as the M. O. M. (Ministry of Munitions), but it is to all intents a Ford tractor and doubtless represents the immediate result of Henry Ford's gift of his designs and data to Great Britain.

It is stated that 3,000,000 acres of hitherto uncultivated land are to be tilled this year and that the Government itself will handle 1,000,000, leaving the other 2,000,000 to private enterprise. It is also calculated that the 10,000 tractors to be built by the Government will only be about half the total quantity required, which means that America will be relied upon to export as many as shipping room can be found for.

It appears that there has been made only one important alteration to the design as originally produced, this being an increase in the stroke from 4½ to 5 in., the bore being 4 in. The transmission and the detail remain essentially the Ford, even including the flywheel magneto.

The Ministry has already chosen certain firms among British automobile manufacturers and ordered them to construct certain parts, but a large portion of the supply will be contracted for in the usual way. Where the tractors will be assembled and by whom has not been announced as yet.

This action by the Government is of an importance exceeding that of dealing with present problems of food production. The existence of 10,000 standardized tractors in Great Britain, to say nothing of the large quantity to be imported, will finally end the day of old fashioned farming.

—

DETROIT, June 6—Ford has sent a crew of tractor workers to the Ford plant in Manchester, England, and will send more soon.

—

U. S. Tests Caterpillar Tractor

ROCK ISLAND, ILL., June 2—A newly invented caterpillar tractor was demonstrated this week before a board of military critics at the Rock Island arsenal. Present were Colonel Burr, commander of the arsenal; Major Ramsey and Captain Capron of the U. S. Army, and other officers. The first move was to operate the tractor into a deep clay pit, dragging a 4.7 field piece and carriages with it. Without pause, it thrust its iron beak up the opposite side and waded into a deep swamp. Engine and all went under water, but the engineer remained at his post with his head high like the periscope of a submarine. The machine plowed its way out without losing any of its train, and the route was retraced. Some trouble was experienced in negotiating the bank after leaving the water, but a couple of railroad ties were dropped in the path, giving the necessary footing. A steep bank was ascended, and although spectators feared that the machine would fall over backward, due to the sharp ascent, there was no mishap. A tree 6 in. in diameter, was cut off without retarding the progress of the machine.

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France Bans Tractor Exports

PARIS, June 2—France has prohibited by presidential decree of May 27 exportation of agricultural machinery, including motors and spare parts, subject to the usual exceptions.

—

Little Opportunity for Light Armored Cars on French Front

PARIS, May 1—Many erroneous impressions have gone out with regard to the work armored cars have been doing on the French front. So far as light armored cars are concerned there has scarcely been a single case of their being used on the Western front because the ground is so torn up due to shell fire that it is impossible for so large a target as a light armored car to share in maneuvering work. The protection of such cars is very limited, even to the smallest ammunition.

This lack of their use on the Western front can scarcely be considered an indication of uselessness, however. Rather it must be considered a restriction on their use due to unfavorable conditions.

On the other hand, the motor trucks fitted with anti-aircraft guns have been doing steady, consistent work all of the time.

—

Firestone Adds Supersize Cord

AKRON, OHIO, June 2—The Firestone Tire & Rubber Co. has added a new tire to its line called the Firestone Supersize Cord. The cords are laid diagonally and a feature of the tires is that each one is of unusually large size, a 34 by 4-in. casing, for example, being about ½ in. larger than the ordinary fabric 34 by 4 size. Prices will be approximately 50 per cent higher than for fabric casings.

—

3000 Wayne Tractors a Year

WAYNE, MICH., June 4—The Wayne Tractor Co. plans to start delivery of its tractor within 60 days, and operate on a schedule of 3000 tractors per year. The company will manufacture two models, one a semi-caterpillar type, and the other a wheel drive.

Specifications are as follows: Engine, four-cylinder, valve-in-head, cylinders cast in block, with centrifugal fly ball governor. Ignition will be by a high-tension magneto, equipped with an impulse starter. The control and drive is of automobile type, with two-speed gearset and inverted cone clutch.

A feature of the tractor will be a differential that may be thrown into or out of action at the will of the driver, so that on a hard pull both wheels may be positively driven and prevented from spinning. The normal speed is 1¾ m.p.h. on low, and 2½ m.p.h. when plowing. The weight is 4400 lb.

—

Ford Profit $21 Per Car

DETROIT, June 6 — Vice-President Klingensmith of the Ford Motor Co. testified in the Dodge-Ford suit that Ford cars cost $260 each to make and are sold to dealers for $281, giving the company a profit of $21 per car. He said the Ford company aims to make 12.01 per cent gross on $250,000,000 business this year.

—

Declare Ford Plans Practical

DETROIT, June 4—William Livingstone, president of the Dime Savings Bank, and for many years president of the Lake Carrier's Association, testified to-day in the trial of the Dodge-Ford suit and told how he had for the past 2 years assisted Henry Ford in perfecting plans for the improvement of the River Rouge, where the Ford blast and tractor plant are to be built. He stated that the government's engineers, Secretary of War and the congressional committee favored the plan.

—

Delion Has All-White Tread

TRENTON, N. J., June 4—The Delion Tire & Rubber Co. is now supplying its tire with an all-white tread, a tone between an india tint and a light buff. The Delion company on April 15 increased its guarantee to 6000 miles, and at that time slightly increased the prices and subsequently has made no further increase.

—

CLEVELAND, OHIO, June 5—The Hydraulic Pressed Steel Co. has declared a regular quarterly dividend of 2 per cent on the common stock payable July 1. This is on the capitalization as increased by the 125 per cent stock dividend; the dividend on the increased capitalization remains at the same rate as on the old.

—

GRAND RAPIDS, MICH., June 5—The United Truck & Equipment Co. has declared a dividend of 1¾ per cent on its preferred stock.

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NEW YORK, June 6—The Kelly-Springfield Tire Co. has declared a quarterly dividend of $1.50 per share on its preferred stock, payable July 2 to stock of record June 18.

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HOUSTON, TEX., June 5—The Texas Co. has declared a dividend of $2.50 per share payable June 30 to stock of record June 11.

British Engineers Co-operate

Standardization Work Causes Consolidation of Effort Among Societies

LONDON, May 14—A new committee, to be known as the Technical Committee of the Motor Industries has been formed by the Institution of Automobile Engineers and the Society of Motor Manufacturers & Traders in order to co-ordinate the many technical questions which arise in connection with the automobile industry and which have been handled independently in the past. For instance, the Institution of Automobile Engineers formed a Steel Committee over 2 years ago that did much useful work for the purpose of standardizing steels for use on automobiles and they are also represented on many of the automobile subcommittees of the Engineering Standards Committee. The Society of Motor Manufacturers & Traders have at the same time been represented on those sub-committees, while various other technical matters have been dealt with by their standardization, technical and research committee which has existed for some time.

Matters have now been put on a better footing and a joint permanent committee has been formed by the Institution of Automobile Engineers and the Society of Motor Manufacturers & Traders which will be known by the above title. It is hoped that by this pooling of interests not only will all overlapping be prevented in future, but that the committee strengthened as it will be by the addition of representatives nominated by the various government departments and institutions, will be recognized by the council of Scientific and Industrial Research and all concerned, as the proper body to treat with in all technical matters connected with the motor industry.

Invitations to be represented on the committee have already been accepted by the following:

National Physical Laboratory...Dr. Stanton
General Post Office.....Capt. Wheeler
Institution of Mechanical Engineers,
Dr. Hele-Shaw
Iron and Steel Institute.....J. H. Dickenson
Commercial Motor Users' Association,
George Watson

The Technical Committee will take over the work hitherto carried on by the standardization, technical and research committee of the Society of Motor Manufacturers & Traders, the steels committee and the standardization committee of the Institution, and the research committee which is carrying out research on the E. S. C. British standard steels for automobiles with the addition of aircraft steels and which is financed by a government grant of $5,000 and a donation of $5,000 from the Society of Motor Manufacturers & Traders and the trade generally. The work in the various directions will be carried out either by the existing committees or by specially appointed sub-committees of representative character who will report to the main committees which in turn will deal with the government department concerned, or with the Engineering Standards Committee.

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Pa. Expects 400,000 Cars

HARRISBURG, PA., June 2—The order for 1918 license tags will comprise 400,000 sets, the largest order given since the automobile license order was established nearly 10 years ago.

U. S. Fliers Train in France

Aviation Course to Be Completed on French Soil in Special School

WASHINGTON, June 1—The Aircraft Production Board announces that three of the aviation fields which the War Department has planned are actually under construction; that cadets are now in training at the preliminary aviation schools established in the six representative engineering colleges and universities chosen for the work; that training planes will be ready for the aviation fields when they are completed, and that instruction of about 500 aviators will begin not later than July 20.

The board stated to-day that the Government has not only rushed its plans for the completion of its American fields, but that a site has already been selected, contracts have been let, and preparations for construction are under way for a duplicate of the American standard two-squadron field to be prepared in France for the first aviators graduated from the American fields. As the new men leave the American fields at the end of their four months' training they will fly to the Atlantic Coast and embark for France. On French soil, under French instructors and with French machines, they will complete their preparation for actual work at the front.

—

Buys Interest in Castings Company

DETROIT, June 1—B. W. Collins has purchased a considerable interest in the Marshall Castings Co.

American Fliers in Paris with the French Staff

THIS photograph, showing American fliers in Paris with the French staff, was taken shortly after war was declared by the United States against Germany. Seated in the middle of the front row are two American officers, Captains Johnson and Harmon, who arrived from the United States and remained to take a course in the Caudron school

French Air Schools Concentrated

Greatest Aviation Training School in World Formed by Combining Eight

PARIS, May 1—The greatest aviation training school perhaps in the world has now been started "somewhere in France," many of the other big schools throughout the country having been brought to this point so as to have the schools for teaching flying with the different machines all together. The schools located at this point are Farman, Voisin, Caudron, Nieuport, Schmidt, Bleriot, Catterone and Breguit. Practically every airplane used on the front has its school at this point where all classes of work are taught except acrobatics. The Nieuport machines are the only ones used in acrobatic work, and the school for this is located at another point in France.

It is a most interesting place where all these great airplane schools are located. Here the aviators are taught everything in connection with planing, including all kinds of repairs for planes and motors, night flying, bombing, photography, observation, etc. There are very extensive repair shops nearby where complete instruction in all kinds of motor and plane repairs is given. It is necessary when reaching the school in the morning to go a great many miles by truck, followed by a long walk.

Many Americans connected with these French aviation schools are wondering what their status will be.

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Hayes Wire Wheels on Marmon

INDIANAPOLIS, June 6—The Nordyke & Marmon Co. has contracted with the Hayes Mfg. Co., Detroit, for wire wheels as stock equipment on its 1918 models.

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OWNERS' TAX REPLACES 5 PER CENT LEVY

(*Continued from page* 1069)

The Senate Finance Committee's bill is now practically complete except for the newspaper and magazine sections, and Senators Simmons, chairman, and Penrose, ranking Republican member, are holding informal conferences with representatives of publishers and officials of the Post Office Department regarding the proposed taxation on publications in lieu of the increased second-class mail rates carried in the House bill. The Senate bill will carry an excess profits tax of 16 per cent, as carried in the House bill.

Treasury experts estimate that there are 1,400,000 owners of cars subject to the $7.50 tax, 760,000 subject to the $10 levy, 1,219,000 in the $15 class, and 231,000 subject to the $20 rate. The committee's plan provides:

"That on and after July 1, 1917, special taxes shall be, and hereby are, imposed annually on owners of automobiles and motorcycles, the rate of tax to be based on each automobile or motorcycle as follows: Motorcycles, $2.50; automobiles, listed retail price at time of purchase not over $500, $7.50; over $500 and not over $1,000, $10; over $1,000 and not over $2,000, $15; over $2,000 and not over $3,000, $20; $3,000 and over $25.

"Provided, That the special taxes herein imposed shall not apply to manufacturers and dealers as to unsold automobiles and motorcycles held for sale, or to owners of automobiles and motorcycles held for sale, or to owners of automobiles or motorcycles used exclusively for business; provided further,

"That evidence of payment of the tax shall be by receipt or stamp to be attached to automobile or motorcycle, under such rules and regulations as may be prescribed by the commissioner of internal revenue, with the approval of the Secretary of the Treasury; and provided further,

"That the special tax paid within the fiscal year shall not be imposed again within that fiscal year if ownership changes."

In deciding to exempt trucks from taxation on the theory that they are a necessity to business, the committee also decided to exempt all cars used exclusively for business purposes. This means that taxicabs, other cars of the jitney type used exclusively for passenger carrying purposes, and motorcycles used in business pursuits, only, will be exempt.

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Illinois 50 Per Cent Fee Increase Approved

SPRINGFIELD, ILL., June 2—Governor Lowden has approved the bill of Representative Meents increasing the automobile license fee 50 per cent in 1918 and 1919 in order to secure funds to meet the $60,000,000 hard roads bond issue. The provisions of the bill are as follows: Cars of 10 hp. and less: $4.50; 10 to 25 hp., $6; 25 to 35 hp., $9; 35 to 50 hp., $16; and $20 per year for cars of more than 50 hp. In 1919, the fees are again to be increased.

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Ambulance Camp for Allentown

WASHINGTON, May 31—Allentown, Pa., has been selected as the site for an ambulance corps camp, most probably the only one of this character to be established in the United States. About 5000 men, 2800 ambulance automobiles and 125 officers to instruct the men will comprise the camp.

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A. A. A. Liberty Bond Week June 11

WASHINGTON, June 6—Beginning June 11, the American Automobile Assn. will undertake a special campaign in the form of Liberty Bond Week for the sale of Liberty bonds among the members of its 900 clubs.

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Liberty Aids Liberty Bond Drive

DETROIT, June 2—The Liberty Motor Car Co. is supplying through its distributers and dealers cards advocating the purchase of Liberty bonds.

Titan Motors Co. Formed

Hinkley of Chalmers, Gloetzner of Covert, and Mendelssohn of Fisher Members

DETROIT, June 2—The Titan Motors Co. has been formed in this city with a capital of $350,000 with A. A. Gloetzner, who is in charge of the sales, engineering, and service departments of the Covert Gear Co., Carl C. Hinkley, chief engineer of the Chalmers Motor Co. and Louis Mendelssohn, treasurer of the Fisher Body Corp., incorporators. The company will manufacture motors for trucks, passenger cars, airplanes and submarines. For the first 6 or 8 months a temporary plant which has been leased will be used and production will start with twenty-five motors a day, which officials of the company state is a very low figure as compared to production plans a year hence. An option has been taken on land and construction of a factory will soon be commenced.

Carl C. Hinkley, who is chief engineer of the Chalmers Motor Co. and also head of the Detroit Section of the Society of Automotive Engineers, will resign from the Chalmers company within the next few months and assume the duty of president of the Titan Motors Co. A. A. Gloetzner has been elected vice-president. William Fisher is secretary and treasurer. Mr. Fisher is closely allied with the officials of the Fisher Body Corp. Directors of the company include, C. C. Hinkley, A. A. Gloetzner, William Fisher, Louis Mendelssohn, treasurer of the Fisher Body Corp., A. Mendelssohn, secretary of the Fisher Body Corp., Frederick J. Fisher, president of the Fisher Body Corp., Charles Fisher, factory superintendent of the Fisher Body Corp. It is anticipated that the company will be steadily producing truck motors upon which it will first devote its energies by Aug. 1.

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Liberty Bonds for Maxwell Prizes

DETROIT, June 4—The Maxwell Motor Car Co., Inc., will give $50,000 in United States Liberty Bonds to owners and dealers in a 1-gal. gasoline economy test to be held June 16 to 25. The company expects an entry list of 40,000 cars.

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Anti-Trust Suit Against Raleigh Ford Branch

RALEIGH, N. C., June 4—An anti-trust suit has been brought in this State against the Ford Motor Co.'s branch in this territory. A summary of the charge is that the Ford company is very restrictive in its contracts with its dealers, does not permit them to sell other cars and insists that they handle only such parts as are manufactured by the Ford company.

The Ford company's contention is that it insists upon its dealers selling only Ford parts because they are better than the so-called imitation parts.

Emerson Motors Co. in Receivership

Three Stockholders Bring Charge of Fraud, Conspiracy and Stock-Jobbing

NEW YORK, June 4—A receiver in bankruptcy was appointed to-day for the Emerson Motors Co., which achieved national prominence during the past year through advertisements boosting the sale of its stock.

The receiver was named at the request of three stockholders, whose names and claims are: Francis M. Justis, $300; David Rosenthal, $100; Carmine Zamarro, $500. The receiver is John B. Johnston, a law associate of W. Bourke Cockran.

The allegations of the three stockholders are voluminous. They charge that the company, incorporated under the laws of Delaware for $10,000,000—$3,000,000 common and $7,000,000 preferred—was originated as a "stock-jobbing scheme" for getting the money of an "unsuspecting public."

It is further claimed that the assets do not exceed $100,000 and that the liabilities are "far in excess of $500,000." Of the stock, which was so widely advertised, it is charged that $2,700,000 of it—$10 par value—was sold to Nicholas F. Wilson, for underwriting, on his promissory note for $470,000, that $3,000,000 of it went to Emerson, Hupp, Campbell and others and that $1,000,000 is in the treasury.

As to the industrial progress of the enterprise, it is charged that the company never had serious dreams of being a manufacturing giant, despite the advertising claims, and that much of the money realized from the sale of stock has been spent in advertising the sale of stock and has been otherwise dissipated.

Claimed Big Car Orders

The company is said to have claimed it had orders for 60,000 cars, but this the petitioners doubt, and it is also asserted that the promoters must have had doubts of their ability to wring a fortune out of a car that would sell at retail for $395, as was advertised.

The attention of the court is called to the Emerson financial statement of Aug. 15, 1916, in which, it is stated, "plans, specifications," etc., are listed at $6,999,000, the plant at $5,312.41 and the "tools and machinery" at $930.41.

As an act of bankruptcy justifying the petition it is charged that the company recently transferred to creditors $10,000.

The Emerson Motors Co. made its first appearance in the middle of 1916. Later offices were opened at 1328 Broadway, and it was announced that the car would be a four with a 3¾ by 4 block motor, with 110-in. wheelbase, one-man top and considerable equipment.

In October, 1916, it was announced that the plant of the Peckham Railway Car Truck Co., in Kingston, N. Y., had been secured, and that the production schedule called for 30,000 cars in 1917. With electric lights, starter, speedometer and tire carrier the car, it was advertised, could be secured for $470. It was stated that manufacture of 500 cars would be caried on during the latter part of 1916 in a plant in Long Island City, and that activity then would be concentrated in Kingston.

Late in October THE AUTOMOBILE made a personal investigation of the Emerson plant and found that manufacture seemed really under way. Stocks were on hand and cars were being assembled. No dealer contracts had been assigned, although quite a few retail sales had been signed up. An audit by the American Audit Co. showed liquid assets of $551,000; cash on hand, $307,447, and securities, $182,000.

In March R. C. Hupp, the designer of the car and formerly with the Hupmobile, resigned as vice-president, director and chief engineer of the company and opened an office of his own in Long Island City for other enterprises. At the same time the company, according to investigation, was building 5 cars a day and had shipped quite a few cars. While the project did not measure up to some of the big-production ideas regarding the company it nevertheless was proceeding with manufacture.

About 2 weeks ago the company had a stock of about 200 bodies on hand, a quantity of frames, wheel rims and other parts. It stated that it was having some difficulty getting transmissions but that cars were being driven out at the rate of five a day.

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Fourteen Emerson Men Indicted for Mail Fraud

NEW YORK, June 5—One hour after a receiver in bankruptcy had been appointed to-day for the Emerson Motors Co. fourteen men connected with the company and its stock promotion were indicted by the Federal grand jury on a charge of conspiring to use the mails to defraud the public.

The charges cover eighty-seven typewritten pages and in substance allege that the company sold its stock on representations which it did not intend to carry out. The allegations are similar in substance and tone to those made by the petitioners in bankruptcy, whose claims are set forth in the accompanying article.

Those indicted are: Theodore A. Campbell, president; Robert Craig Hupp, former vice-president and general manager; George N. Campbell, treasurer; George B. Gifford, Nicols Field Wilson, Willis George Emerson, Henry B. Humphrey, William A. Morgan, Osborne E. Chaney, Frank Sturkens, William Loomis, Byron R. Riess, William H. Stetson, and Robert P. Matches; the companies involved are: Emerson Motors Co., manufacturer; C. R. Berry & Co. and Robert P. Matches & Co., brokers; H. B. Humphrey Co., Boston, advertising agent.

Bail was fixed at from $2,500 to $10,000 for the various men and was readily furnished.

Concentrates On Magnetos

Bosch Closes Plainfield Plant and Drops Manufacture of Electric Systems

NEW YORK, June 2—The Bosch Magneto Co., with plants in Springfield, Mass., and Plainfield, N. J., has practically decided to concentrate all its energies on the production of a limited number of standard types of magnetos for the immediate future. The Plainfield plant, which has been devoted to the production of electric lighting and starting apparatus, will be closed.

The change follows the resignation of President Otto Heins and several other executives about a month ago, and the subsequent resignation of several factory executives and a number of mechanics. All these men are German subjects with property in Germany and severed their connection with the Bosch company in order not to abrogate their German holdings. Another factor has been the United States Government order forbidding alien enemies to approach nearer than ½ mile any government munition plant. While the Bosch company has not been producing munitions in the strict sense of the word, the entry of the United States into the war has placed magnetos in the class with munitions.

Executives of the Bosch company state that the decision to concentrate on a few types of standard model magnetos will not curtail production but will have the opposite effect. It is stated that already the good effects of such concentration have been felt.

Prior to the entry of the United States into the war, the Bosch company was supplying large quantities of magnetos for truck equipment on vehicles shipped abroad. Shortly thereafter, however, a clause was added to standard contracts forbidding the resale of Bosch equipment to belligerents, and this has somewhat reduced such business. It is believed, however, that this clause will not affect equipment sold to the Government.

Following the resignation of President Heins, former secretary Carl Schurz was elected to the presidency and now heads the company. Heins has retired temporarily and is spending his time traveling. William De Voe has been elected secretary, and G. Jahn vice-president and general manager. A. H. D. Altree assumes the duties of sales manager.

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Kent Motors in Bankruptcy

NEW YORK, June 1—The Kent Motors Co. of New Jersey and Delaware has gone into bankruptcy. L. G. Beekman has been appointed receiver.

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Absorber Company Bankrupt

GRAND RAPIDS, MICH., June 1—The National Shock Absorber Co. has filed a voluntary petition of bankruptcy with $3,669.55 liabilities and $9,905.05 assets, the latter representing the book value of stock and accounts.

Use Few Tractors in Argentina

Farmers Prejudiced—Horses Plentiful and Cheap—Automobiles Are Popular

BUENOS AIRES, April 25—The sale of farm tractors in Argentina is very low, considering the fact that no more ideal country could be wanted for the use of farm tractors. In the camp or country the land is level as far as the eye can see. There is not a stone to break the monotony and no more appropriate field for the use of the farm tractor could be desired. Notwithstanding this favorable condition, the tractor is not in good repute in Argentina to-day. This is not due to any defect in the tractors but largely to a series of conditions. The situation might be summed up as follows:

The first tractors brought to Argentina were of the very large type and many of them were sold in different sections, to the large estancerios, who were enjoying great prosperity at that time and had plenty of money. With these people these large tractors were not a success, not owing to the mechanical construction or faulty design, but because those handling them had a very vague knowledge of the engines. It was really a shortage of mechanics. To this must be added the high price of fuels. The shortage of mechanics was really the greatest obstacle to the successful use of the tractor in Argentina. The memory of those days still lives through many parts of the country, and it will be some time before the owners of them will forget that they were money-losing propositions. These owners abandoned them for all forms of farm work with the exception of threshing purposes. In this field they were not a success because the straw-burning engine proved much cheaper for threshing purposes.

Prejudice Being Overcome

Although this refers to pioneer times, the handicap then imposed on the tractor field still exists. The old prejudice is gradually losing ground, thanks to the American cheap and medium-priced cars, of which 80 per cent are selling through the camp or country. These cars are training mechanics, they are doing a wonderful educational work in this regard and are naturally paving the way for the small gasoline tractor. To-day whatever tractors are being sold in Argentina are of the small type, but even these sales have practically ceased since the war. Argentina has certain existing crude oil supplies, but they have not been satisfactorily developed, so that the fuel price is still very high. Previous to the war the majority of the gasoline was shipped in from England, but since July, 1914, a great supply not only of gasoline and kerosene but oil for fuel purposes has been coming from the United States and Mexico. The price of gasoline is very high, ranging from 50 to 70 cents a gal. The price of kerosene is very little less because freight on kerosene is as high as on gasoline. Because of this there is little advantage with the tractor burning kerosene.

To better appreciate the present atmosphere with regard to a tractor in Argentina, it should be borne in mind that this country suffered a money crisis dating from the start of the war in 1914. Added to this money crisis was the further calamity of poor crops. Many farmers found themselves with restricted credits, gasoline and kerosene rose in price, and crops dwindled. Horses were plentiful and still are. During the past year, instead of conditions improving, they have practically gone from bad to worse.

Notwithstanding this unfavorable farm condition, the farmers are watching the tractor development, but it is doubtful to expect much business for some years to come. There are many horses in the country, and they are too cheap and too easy to keep, as they require no feeding the year round. Farmers do not feed their work horses in Argentina as they do in the United States. They generally have plenty of grass and enough horses, so they are able to work one outfit of horses on one day and another outfit the next day.

The whole farm system in Argentina will unquestionably change in years to come. What rural Argentina needs is more population. More land must be placed under cultivation. So long as the war is going on the population has been dwindling in the camp rather than increasing. The farming population is largely Italian, and the war has drawn heavily on them.

The agricultural situation in Argentina is not permanently bad. This country is one that recuperates readily and responds quickly to good crops. A few years of good crops and freedom from locusts will mean the putting of more land into cultivation. A greater surplus of money in the country will unquestionably result in a more businesslike development of the oil properties of the country, which should reduce the price of fuel. At present it is possible to hire land plowed for less than the cost of gasoline to do the plowing with tractors.

Unquestionably the increased sale of automobiles throughout the country will make it easier to sell the small tractor. The fact that Ford has a large assembly plant in this city, which was started last fall, and which is still over 500 cars behind, shows that the buying capacity of the country still exists. So long as small cars sell there is good hope for the small farm tractor.

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Gorey Secures More Parts Agencies

NEW YORK, June 4—Joseph C. Gorey, who has handled replacement parts in this city for 5 years as Joseph C. Gorey & Co., is extending his business to become a distributor of standard manufactured parts. This week the company secured metropolitan distributing rights on the universals and clutches of the Hartford Auto Parts Co., Hartford, Conn. Rights also had previously been secured on the Mayer carbureter and Warner gears.

Argentine Business Is Better

Industrial Conditions Improve Though Crops Shrink—Favor U. S. A. Cars

BUENOS AIRES, ARGENTINA, May 7—There has been a general impression current in business circles that the industrial situation in Argentina has taken a turn for the better during the last few weeks and the reports of railway traffic receipts bear out this assertion. Railroad companies are a fair indication of Argentine conditions, and of the fourteen companies which reported their business on April 20 only three showed a loss compared with the corresponding week of a year ago, and only six showed a loss during the present year to date.

There has been a shrinkage in crops as shown by the following figures based on the crop just harvested and that of the previous year. The shrinkage in corn is almost 2,000,000 acres, which fact coupled with the lack of rain, when seeding was in progress had a very serious effect on the country. The figures of the four leading Argentine crops are:

Grain	Acres, 1916-1917	Acres, 1915-1916
Wheat	16,277,500	16,612,500
Linseed	3,245,000	4,047,500
Corn	9,073,925	10,044,625
Oats	2,555,000	2,595,000

Notwithstanding these unfavorable conditions the automobile industry was remarkably robust and enjoyed a boom business all of its own. The standing of the American automobile has entirely changed in Argentina in the last 4 years and to-day the public knows what it is capable of doing. The American automobile business has increased over 1000 per cent in 3 years in this country, and this increase would have been much greater had Buenos Aires dealers been able to get all the cars they wanted.

There has been a perceptible improvement in the development of better country roads which has largely been brought about by the automobile. Previous to the advent of the American automobile the road movement was at a very low ebb. The value of the dirt road is now being appreciated.

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Blevins Sells His Interests

TOLEDO, June 1—Harry W. Blevins has retired from the Studebaker Sales Co. of Ohio, which was formed last October and is a combination of the Blevins Auto Sales Co., A. R. Davis Co. and the Aaron DeRoy Motor Co., of Pittsburgh. Mr. Blevins has sold his interest and is succeeded by A. R. Davis, who was vice-president; DeRoy moves up to the place of vice-president, and J. O. Hahn, who was treasurer of the Ohio company, retains that position. Headquarters of the company have been moved to Cleveland from Toledo. The company is one of the largest territorial distributors in the country and controls Studebaker sales in Ohio and parts of five adjoining states.

Uruguay Conditions Unfavorable

Serious Drought Affects Crops and Business—Car Sales Continue Good

MONTEVIDEO, URUGUAY, May 1—General conditions are not favorable in Uruguay, the smallest country in South America, for automobile sales, because the very dry weather during the past summer months of November, December, and January amounted to a serious drought and nearly ruined many of the cattlemen. Notwithstanding this, the automobile business has been really good; in fact it has been abnormally good when compared with other lines of merchandise. Sales of American cars would have been much greater during the past season if there had not been a shortage with all dealers owing to transport troubles.

Although the season has been bad it has been good for the automobile in Uruguay in that a good deal of road building has been pushed. This country leads all others in South America in the good roads movement. Macadam roads are being built all over the country and all that is needed is a co-ordination of the different roads into a national system. In the cities the old rough stone block pavement which was hard on tires is rapidly giving way to asphalt. With a recurrence of good crops the road situation should materially assist in selling automobiles.

Each year sees many changes in the automobile industry in Uruguay. In this connection the use of anti-skid chains is rapidly increasing. As yet the farm tractor is not known in Uruguay; even motor trucks and light delivery wagons are very limited. Gasoline is selling at approximately 50 cents per gallon.

Among the American machines which are selling well and many of which are behind in their orders are Ford, Studebaker, Cadillac, Buick, Maxwell, Dodge, Hupmobile, Jeffery, Overland, National, Regal, and a few others. It is surprising how many buyers there are for automobiles listing from $1,250 to $2,500 while general conditions are so unfavorable.

Drexel Dissension Disappears

CHICAGO, June 4—Internal dissension and financial difficulties which threatened to disrupt the Drexel Motor Car Corp. have been ironed out, and, according to A. J. Farmer, president and general manager, the concern will proceed on a better foundation than heretofore. Early in May, Farmer, who owns the patents on the sixteen-valve engine, said to be Drexel's most valuable asset, was asked to resign and was temporarily ousted on a charge of mismanagement. This became public when two South Side banks became involved through investigations of bank examiners. One of the banks financed the Farmack Motor Corp., predecessor of the Drexel concern, and Thomas McFarland, president of these two banks, was said to be a heavy stockholder in Drexel and the Drexel organization was reported to be heavily indebted to one of these banks.

Last Saturday there was a creditors' meeting at which it was voted, according to Farmer, to withdraw all claims for the present and the matter is to be taken up with Judge Carpenter of the Federal court this week. Yesterday a directors' meeting was held at which stockholders agreed to furnish additional funds to put the concern in good financial condition. Officials who started the dissension resigned and Farmer is back at the head of the organization. The men in the plant were laid off temporarily while the difficulties were being smoothed out, but Farmer says they will be put to work again, in a few days.

Another directors' meeting will be held next Sunday.

Woods Dual Power Car Enlarged

CHICAGO, June 4—The Woods Motor Vehicle Co. is making deliveries of an enlarged and revised model Dual Power car. But one model, a four-passenger coupé selling for $2,950, will be made; stock colors are Royal blue and Brewster green, and wire wheels are $25 extra. The principal changes include the adoption of a four-cylinder 2¾ by 4-in. Continental engine, the lengthening of the wheelbase to 124 in. and the use of tires 35 by 4½. The electrical elements are identical with those of the previous model.

In appearance the car has been changed but little except for the adoption of a radiator which slants backward almost imperceptibly. The factory is prepared to produce between 650 and 750 of this model this year. V. E. Gustafson, secretary of the company, is at present making a tour of Eastern states in one of the new cars.

Australia May Cut Imports

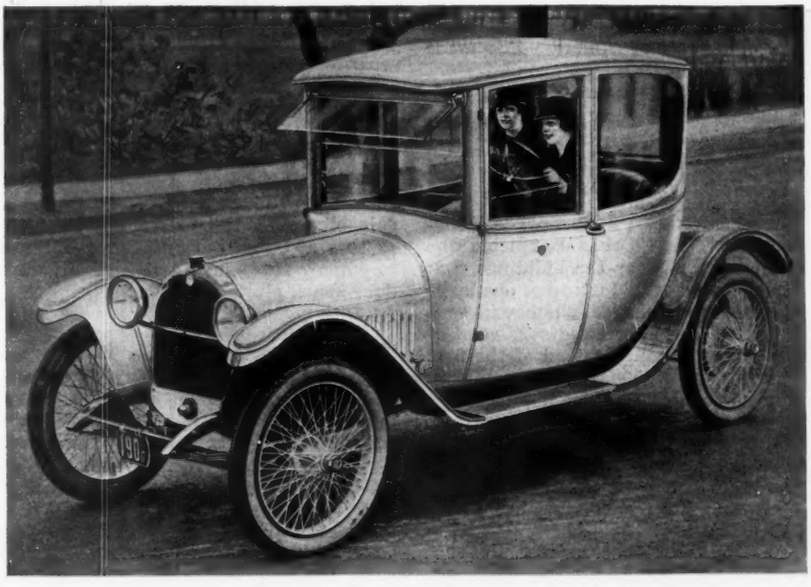
Appoints Board to Study Limitation—Motor Vehicles Only 45% of 1916 Imports

MELBOURNE, AUSTRALIA, May 1—The Federal government is strongly considering restricting the importation of luxuries into Australia and with this thought in mind the decision has been reached by the Federal government to appoint a board of three departmental officers, one from the Treasury, one from the Customs Department, and one from the Defense Department, to go into the entire question of importations. It is expected that automobile chassis, motorcycles and accessories will be included in this list, as it is expected this committee will use as a basis of its investigations a list of foods and articles similar to that employed by Great Britain. The automobile dealers are strongly opposed to any restriction on the importation of motor vehicles and accessories.

Notwithstanding there has been no limitation to date on importations, there has been a decrease of 45 per cent in the number of chassis imported during the first 3 months of 1917 as compared with the corresponding months of a year ago. If importations continue to decrease during the remainder of the year, the totals for 1917 will scarcely be one-half that of 1916.

N. Y. White in New Home

NEW YORK, June 4—The New York branch of the White Co., which has for years been located at Broadway and West Sixty-first Street, is this week holding an opening in a new sales building at Park Avenue and East Fifty-seventh Street.



New Woods four-passenger Dual Power coupé, selling for $2,950

Personals

CHICAGO, ILL., June 4—John Whyte has been appointed chief engineer of the Bailey Non-stall Differential Corp. Mr. Whyte was formerly the battery service engineer of the Prest-O-Lite Co., of Indianapolis, Ind.

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DETROIT, June 5—Tom O. Jones, recently appointed to foreign service on the United States industrial research commission, as previously reported in THE AUTOMOBILE, left to-day for Russia.

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DETROIT, June 6—H. L. Worbois has been appointed chief engineer and production manager of the A. J. Detlaff Co., which is opening a new clutch department to manufacture a new design of disk clutch for automobiles, trucks and tractors.

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CLEVELAND, June 2—Walter C. Keys has been appointed an assistant to J. G. Utz, director of engineering for the Standard Parts Co., with headquarters at the executive offices here. Mr. Keys has been for several years with the Cadillac Motor Car Co., where springs were his specialty.

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DETROIT, June 1—G. M. Bicknell has been appointed sales engineer of the Carter Carbureter Co. of St. Louis, and will have charge of factory sales for Detroit.

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DETROIT, May 31—Stephen D. Briggs has returned from London, where he has been representing the Hupp Motor Car Co. Mr. Briggs will return to his old field as branch manager of the Northwest Hupmobile Co. at Minneapolis.

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BRIDGEPORT, CONN., June 1—The Locomobile Company of America has made several changes in the executive organization.

P. W. Hine has been appointed assistant sales manager. Mr. Hine was formerly manager of the Bridgeport branch. M. A. Pollock has been appointed manager of the Bridgeport branch.

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DETROIT, June 6—Leslie R. Acton, vice-president of the Redden Motor Truck Co., has resigned.

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DETROIT, June 2—H. L. Dyer has been promoted by the Scripps-Booth Corp. to be special representative of the Southern district. His headquarters will be in Atlanta.

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DANVILLE, ILL., June 1—Jack F. Ryan, manager of the Danville branch of the Gibson Co., Overland distributors for Indiana and eastern Illinois, is undergoing military training at the officers' reserve corps camp at Fort Benjamin Harrison.

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NEW YORK, June 6—L. E. Murray has been appointed manager of the New York branch of the United Motors Service, Inc., scheduled to open June 11 at 239 West Fifty-sixth Street. R. A. Sturgeon has been appointed assistant manager. Mr. Murray was formerly with the Dayton Engineering Laboratories Co. and Mr. Sturgeon with the Remy Electric Co.

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DETROIT, June 5—Harry F. Bryan has become research engineer of the Harroun Motors Corp. He was formerly research engineer of the Master Carbureter Co.

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DETROIT, June 2—R. E. Winans has been appointed service manager for the Harroun Motors Corp. Mr. Winans was formerly connected with the Paige-Detroit Motor Car Co. as service manager.

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CLEVELAND, June 4—L. H. Mesker has joined the sales department of the Cleveland Milling Machine Co. He was formerly sales manager for Kearney & Trechker, Milwaukee, Wis.

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NEW YORK, June 2—F. H. Tackaberry has been appointed traveling representative with the title of general agent of the American Steel Export Co., Mr. Tackaberry has recently been associated with the Ordnance Engineering Corp. His first trip will be to South America, with Brazil as his immediate objective.

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BRIDGEPORT, CONN., June 2—Clinton B. Amorous, who has been assistant to the general sales manager of the Locomobile Co. of America, has resigned to become assistant factory manager for the Parish Mfg. Co., Detroit. He is succeeded by P. W. Hine, who was formerly manager of the Bridgeport branch, a position now held by M. A. Pollack.

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NEW YORK, June 2—David M. Manning has been placed in charge of an export department recently completed by the L. & D. Motors, Inc., New York, Marion-Handley distributer.

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WALPOLE, MASS., May 31—Richard Everett, formerly of Bridgeport, Conn., has joined the sales organization of the Standard Woven Fabric Co., this city, maker of Multibestos brake lining.

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DETROIT, June 6—Russell Munroe, assistant advertising manager of the Ford Motor Co., has resigned to go to France as an ambulance driver.

Factory Activities

CUMBERLAND, MD., June 1—The Kelly-Springfield Tire Co. has completed the preliminary plans for the buildings that will be erected here. Instead of one large factory, as was believed, there will be a group of at least six buildings, none of which will be small. Instead of the first expenditure of $1,500,000, the company will spend $5,000,000. The main factory will be over 600 ft. long and more than 400 ft. in width and will be from two to four stories in height.

Provisions will be made for a hospital section, rest rooms, swimming pools, eating rooms, etc.

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READING, PA., June 1—The Pyro Ignition Co. of New York will remove to this city, and has leased a three-story factory at Carpenter and Cherry Streets, to employ forty men and women to produce spark plugs.

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MANITOWOC, WIS., June 2—The Wisconsin Aluminum Foundry Co., Manitowoc, Wis., well known in the motor car industry for its large output of special small castings, is installing six additional furnaces in the new foundry addition, 75 by 190 ft. recently completed. The company has accepted an order from the war department for 2,000,000 German silver bushings for the tops of army canteens, and is obliged to produce at least 10,000 a day to meet specifications. In addition, the company is working on large motor car parts contracts which keep the foundry busy at maximum capacity.

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PORTLAND, IND., June 2—The Bimel Spoke & Auto Wheel Co. is completing extensive improvements costing over $60,000, consisting of six large new dry kilns of a total battery of eventually twelve kilns. Each of these kilns is 20 by 53. These kilns permit of drying spokes and felloes for small truck wheels at the rate of 400 sets a day. In all about 3 or 4 acres of new site have been secured, which makes the plant and grounds now cover about two and one-half city blocks. The other chief additions have been a

new sprinkler system throughout, doubling of the rim planing and bending departments, etc. The capacity of the truck wheel department is now 175 to 200 sets of light and medium truck wheels per day.

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BOSTON, MASS., June 2—The V. A. Nielsen Co. electrical service engineers, has opened its electrical service department specializing on starting, lighting and ignition systems. Mr. Nielsen, recently connected with Splitdorf and Apple in the capacity of engineer, will supervise all work.

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MILWAUKEE, WIS., June 2—The LeRoi Co. a large manufacturer of four- and six-cylinder motors for passenger and commercial cars and tractors, has broken ground for a one-story machine-shop addition to its plant at Sixtieth Avenue and Mitchell Street, West Allis. The building will be of reinforced concrete, brick and steel, 80 by 175 ft., with sawtooth roof. The LeRoi Co. several months ago took over the motor business and plant of the Milwaukee Machine Tool Co., and is capitalized at $350,000.

—

MUSKOGEE, OKLA., June 2—The Oklahoma Automobile Co. has purchased the building and equipment of the John B. Woods Plow Co. and plans to convert it into a truck factory. W. R. Lantz is president.

—

DETROIT, June 4—The Michigan Copper & Brass Co. will erect a one-story addition to its plant.

—

DANVILLE, ILL., June 2—The local chamber of commerce is negotiating with the Moore Motor Vehicle Co., Minneapolis, Minn., for the erection of a factory for the construction of a 1-ton truck. The company will maintain an assembling plant in Minneapolis, but desires to establish a manufacturing plant elsewhere. The concern is incorporated for $5,000,000 and has sold stock to the extent of $200,000. Representatives have made two trips to Danville and are favorably impressed with an abandoned car shop plant which has been tendered.

—

ELKHART, IND., June 3—The Crow-Elkhart Motor Co. last week purchased a factory site of 26 acres adjoining the company's present plant and several extensions will be erected in the near future. The company recently completed a new administration building, and a wood working plant, which cost $20,000. Two additional structures are to be erected in near future which will be used for the manufacture of a new line of convertible five-passenger cars the company expects to place on the market.

—

LAPORTE, IND., June 3—The Globe Tire Co. will have its plant ready for operation in 90 days. The new company has bought a large factory building and is converting it into a tire manufacturing plant. Most of the machinery already has arrived and workmen now are engaged in remodeling the plant.

—

WALKERVILLE, ONT., June 1—The building of automobiles has been started in the new Chalmers factory. It is 2 weeks since the erection of temporary buildings began. Over 20,000 sq. ft. of floorspace are now under roof. The new factory is being rushed to completion with all possible speed.

—

NEW YORK, June 1—The Rolls-Royce Co., Ltd., London, has purchased land in Long Island City at the northeast corner of Harris Avenue and Sunswick Street. A four-story garage and service station will be erected.

—

SYRACUSE, N. Y., June 1—The H. H. Franklin Mfg. Co. has increased its factory employees by 26 per cent in the past four months of this year and now employs 2742 factory workers besides 340 office employees. The weekly payroll is now averaging $73,000 and it is expected that the annual payroll for the present year will be about $3,640,000.

—

INDIANAPOLIS, IND., June 3—The Prest-O-Lite Co. has turned over 17 acres of ground near its plant to 200 workmen, who are planting the ground in small garden tracts.

—

CHICAGO, June 1—The Perfection Tire & Rubber Co. is starting a branch plant at Wabash for the manufacture of tire and asbestos cloths. It will be an eight-set plant to employ between 400 and 500 operatives.

—

BENTON HARBOR, MICH., June 1—Negotiations are now under way whereby Benton Harbor will secure a large assembly and distributing plant of the Ford Motor Co. Plans have been drawn up for the building, which will cover a large area, and will be made public as soon as negotiations are completed. Location of a plant at Benton Harbor will give the Ford company an excellent distributing point over Lake Michigan to western centers.

—

RAVENNA, OHIO, June 2—The Oak Rubber Co. which has been operating in Akron for a year has decided to locate here. J. C. Goodman is president.

—

WAGE INCREASES

PITTSBURGH, June 1—The Westinghouse Electric & Mfg. Co. has granted a 10 per cent increase in wages.

—

MIDDLETOWN, CONN., June 2—A 10 per cent wage bonus for the last 3 months and a promise of a similar bonus each 3 months hereafter as long as business conditions warrant have been given employees by the Goodyear Tire & Rubber Co., here.

—

FREEPORT, ILL., May 31—The Stover Mfg. and Engine Co., tractor builder, announced a 10 per cent increase in wages, effective June 1. About 800 men are affected. It is estimated that the increase will cost the company about $50,000 per annum.

—

PRODUCTION

PONTIAC, MICH., June 4—Production of the Oakland Motor Car Co. for the 1917-18 season is scheduled to be 60,000 cars.

—

DETROIT, May 31—The Stroh Casting Co. created three new production records in March, of this year. The foundry turned out 219,723 castings or 687 tons, an increase of 206 tons over last January, which month held the previous high mark. Of these castings 19,019 were transmission cases. The inspection records display a 214-ton increase and the shipping a 679-ton increase.

—

HAWTHORNE, N. J., June 1—The Schafer Ball Bearing Co. has opened a plant in this city and is producing the Schafer ball bearings in duplication of the European product.

By the end of next month it expects to produce on the average about 3000 finished bearings per day. This company is the successor to the interests which prior to 1914 imported these bearings from Europe, and is backed by American capital and interests.

C. Barthel is president and treasurer, H. Daly is vice-president, F. P. Lyons is secretary and J. H. Zeller chief engineer.

A general sales department has been established in Detroit at 901-2 Kresges Bldg., in charge of G. W. Fowler, sales manager.

—

KALAMAZOO, MICH., June 1—The Fuller & Sons Mfg. Co., maker of automobile parts, showed a production during the first 5 months this year of two and one-half times the output of the same period in 1916. The new plants being erected will be ready for occupancy in the summer.

—

AKRON, OHIO, June 2—The Firestone Tire & Rubber Co. is erecting an addition to its plant at a cost of $1,000,000 and will increase production from 20,000 to 30,000 tires per day, as soon as this addition is finished.

—

BRIDGEPORT, CONN., June 2—Deliveries of cars and trucks by the Locomobile Co. of America in 1917 to date show an increase of 34 per cent over the total deliveries a year ago. Domestic business in every department is increasing and the company has sufficient orders on hand to keep the plant busy for some time.

Pig Iron Jumps Suddenly

New and Somewhat Unexpected Rise Partly Due to Large Steel Mill Buying

NEW YORK, June 6—An unexpectedly rapid rise in prices being paid for pig iron is the most significant happening of the week. More details of naval and military requirements as they become known also indicate that the demand from that quarter will be greater than was at first anticipated, while every day the foreign inquiries increase. The slight lull commented upon a week ago, has been of very short duration. The increase in pig is apparently due to steel plants discovering that they are in danger of shortage, now that their own facilities have increased so greatly. The supply of ore, the most basic thing of all, is beginning to loom up as the ultimate limiting factor for production of steel, as it must necessarily be in the last analysis.

At the same time fuel is growing daily more costly and there is no prospect of relief in this direction.

Copper has not changed, and the strike which threatened to tie up a big portion of the supply has been settled.

—

Original Lozier Receipts $1,055,609

DETROIT, June 6—Creditors of the original Lozier Motor Co. meet Friday at the office of the referee in bankruptcy. Total receipts amounted to $1,055,609, of which $255,715 is still to be paid out.

—

NEW COMPANIES

JACKSON, MICH., June 2—The Day-Hamlin Mfg. Co. has been formed here with a capital of $50,000 and will manufacture tractors and tractor parts.

—

UTICA, N. Y., June 1—The Williams Steel Wheel & Rim Co. has been incorporated with a capital of $50,000 to manufacture wheels and automobile parts. C. B. and H. D. Williams and F. Menge are the incorporators.

—

JERSEY CITY, N. J., June 2—The Midland Motor Co., 15 Exchange Place, has been formed to manufacture and deal in automobiles, airplanes, etc. The main place of business of the company is Oklahoma City, Okla. Authorized capital is $1,000,000 in shares of $10 par value, of which $2,000 has been paid in. Incorporators are: Harry B. Davis, Louis H. Gunther and Arthur W. Britton.

—

BUFFALO, N. Y., June 2—The Meldrum Motor Corp. has been organized to make engines, etc., with a capital of $25,000 by A. S. Meldrum, J. F. Hattman and E. A. More.

—

DETROIT, June 1—The Armored Motor Co. has been incorporated with $100,000 capital stock in this city. Incorporators include W. A. Ross, A. L. Mancourt and W. C. Artz.

—

NEW YORK, June 5—The W. J. B. Motor Truck Co. has been incorporated with $100,000 capital to make engines, trucks, etc., by W. J. Baxter, H. F. Gleason and J. I. Bergen.

—

DOVER, DEL., June 5—The Lamson Truck & Tractor Co. has been formed with $2,000,000 capital to make tractors and trucks by B. R. Hoffman, E. J. Perkins and G. D. Harris.

—

DETROIT, June 5—The Progress Auto Equipment Co. has been formed with $50,000 capital to make automobile parts by H. A. Schmidt, K. A. Torge and O. H. Schnepper.

—

Absorbs Sandbo Starter Co.

WILMINGTON, DEL., June 1—The Bear Mfg. Co., maker of automobile starters, has been incorporated with $200,000 capital to do business in Illinois. It has taken over the Sandbo Starter Co., Rock Island, Ill., and will locate its plant in that city.

—

Mason Ribbed Tread Tire

KENT, OHIO, June 5—The Mason Tire & Rubber Co. has placed a new Ribbed tread tire on the market in addition to the Lattice Non-Skid tread which the company has manufactured since its inception. The Ribbed tread has a black top and white side walls. The Mason company is increasing its factory facilities by the addition of a new warehouse.

—

CHANGES IN PRICES

Car	Model	Old Price	New Price	Effective
Oakland,	Sensible Six.	$945	$1,015	June 1
Milburn,	Electric.....	1,685	1,785	June 15

Daily Market Reports for the Past Week

Material	Mon.	Wed.	Thurs.	Fri.	Sat.	Mon.	Week's Changes
Aluminum, lb.	.59	.59	.59	.59	.59	.59	...
Antimony, lb.	.25	.25	.25	.22½	.22½	.22½	— .02½
Bessemer Steel, ton	85.00	85.00	85.00	85.00	85.00	85.00	...
Copper, Elec., lb.	.32	.33	.33	.33	.33	.33	+ .01
Copper, Lake, lb.	.32	.33	.33	.31	.31	.31	— .01
Cottonseed Oil, bbl.	16.30	16.40	16.30	16.30	16.40	16.35	— .05
Fish Oil, Menhaden, Brown, gal.	.84	.84	.84	.84	.84	.86	+ .04
Gasoline, Auto, gal.	.24	.24	.24	.24	.24	.24	...
Lard Oil, prime, gal.	1.95	1.95	1.95	1.95	1.95	1.95	...
Lead, 100 lb.	11.00	11.25	11.50	11.50	11.50	11.25	+ .25
Linseed Oil, gal.	1.27	1.27	1.27	1.27	1.27	1.27	...
Open-Hearth Steel, ton	85.00	85.00	85.00	85.00	85.00	85.00	...
Petroleum, bbl., Kans., crude	1.70	1.70	1.70	1.70	1.70	1.70	...
Petroleum, bbl., Pa., crude	3.10	3.10	3.10	3.10	3.10	3.10	...
Rapeseed Oil, refined, gal.	1.40	1.40	1.40	1.40	1.40	1.40	...
Rubber, Fine Up-River, Para, lb.	.76	.76	.76	.76	.76	.75	— .01
Rubber, Ceylon, First Latex Crepe, lb.	.82½	.81	.81	.79	.79	.79	— .03½
Sulphuric Acid, 60 Baume	1.50	1.50	1.50	1.50	1.50	1.50	...
Tin, 100 lb.	62.50	62.00	61.00	61.00	61.00	58.00	—6.75
Tire Scrap, lb.	.06½	.06½	.06½	.06½	.06½	.06½	...

Industrial Engineers Organize

Permanent Organization of Society Will Be Made in Washington June 15

WASHINGTON, June 1—A permanent organization of the Society of Industrial Engineers will be made in this city June 15. The membership consists of men and women who are industrial engineers, professional technical engineers, accountants, managing executives of commercial and industrial activity, writers, educators and students. Charles Buxton Going, for 20 years editor of the *Engineering Magazine*, New York, was chosen provisional president and *pro tem* chairman of the board of directors at a recent meeting. This comprises fifteen prominent men from various sections of the country, and includes: C. B. Going, F. B. Gilbreth, industrial engineer, Providence, R. I.; E. C. Shaw, vice-president of the B. F. Goodrich Co.; Harrington Emerson, industrial engineer, New York; Charles Piez, president of the Link Belt Co., Chicago; G. DeA. Babcock, production manager of the H. H. Franklin Mfg. Co.; H. F. Porter, Detroit Executives' Club.

Upon completion of the organization its services will be tendered to the Government.

—

Specializes on Factory Sites

NEW YORK, June 2—The Industrial Sites Assn., of America, Inc., has been organized to co-operate with manufacturers in securing suitable factory locations. The association, which has offices at 115 Broadway, is compiling and classifying data concerning properties, sites, buildings, railroad and water facilities, labor conditions, population, etc., of all towns and cities where manufacturing plants could be advantageously established. The association will co-operate with boards of trade, chambers of commerce and similar commercial bodies and will supply industrial information to manufacturers free of charge.

—

CHANGES IN CAPITAL

BUFFALO, N. Y., June 2—Stewart Motor Corp. has increased its capital stock from $325,000 to $1,000,000.

—

CLEVELAND, June 2—The Guide Motor Lamp Mfg. Co. has increased its capital from $100,000 to $150,000.

—

TRENTON, N. J., June 1—The Rubber Goods Mfg. Co., a New Jersey corporation, has decreased its capital from $50,000,000 to $100,000. Under the reduction only $100 tax will be paid. The United States Rubber Co. is the largest stockholder.

—

CANTON, OHIO, June 2—At a meeting of the stockholders of the Hercules Motor Mfg. Co., its capital was increased from $500,000 to $800,000.

N. Y. April Exports Lower

Shipments from That Port Total $5,447,996 Compared with $6,258,549 in March

NEW YORK, June 5—Passenger car, truck and parts exports from this port in April declined nearly $1,000,000. The total amounted to $5,447,996, compared with $6,258,549 in March. Passenger cars showed a small gain over the previous month, numbering 3413, valued at $2,541,844, compared with 3148, valued at $2,278,090 in March. Truck exports declined nearly $400,000. Clearances from this port numbered 744, valued at $1,929,871, compared with 789 in March, valued at $2,311,344. Parts declined from $1,669,115 to $976,281.

As in March, England was our biggest buyer of trucks, her purchases totaling $1,290,594 and numbering 418, or over half of the total truck exports. Our next largest foreign buyer was France, which bought 175 trucks, valued at $406,266. England's truck purchases dropped nearly $600,000 last month on account of the effect of the German submarine activities.

An interesting point brought out in the passenger car export figures is the number of cars bought by British South Africa, which figured as our leading car buyer in April. Nearly one-third of the total foreign purchases were chalked up by that country, her total being $715,599 for 1039 cars. The war has exerted little influence upon the money situation in this consular district. The banks there have a surplus of money. British South Africa is pre-eminently a mining country like Mexico, approximately 60 per cent of its income being derived from the gold, diamond and coal mines.

Australia continues as one of our leading buyers of passenger cars, her purchases being 303, worth $237,355.

Only eleven cars were bought by England last month, valued at $30,631. France took seventy-three, valued at $32,109. Not one car cleared this port for Russia.

Paige-Detroit Profits $770,533

DETROIT, June 4—The Paige-Detroit Motor Car Co. has had net profits of $770,533 for the year ending Nov. 30, 1916, and a net income of $959,954. Gross sales aggregated $10,588,406. These figures have just been reported by the Paige-Detroit Motor Car Co.

DIVIDENDS DECLARED

Stutz Motor Car Co. of America, Inc., quarterly of $1.25 payable July 2 to stock of record June 27.

Yale & Towne Mfg. Co., 2½ per cent quarterly; payable July 2 to stock of record June 22.

Pennsylvania Rubber Co., quarterly of 1¾ per cent on preferred and 1½ per cent on common; payable June 30 to stock of record June 15.

Texas Co. $2.50 per share payable June 30 to stock of record June 11.

Dowse Incorporates Trade Name

CHICAGO, ILL., June 4—The Dowse Rubber Co., capitalized at $2,500,000 of which $1,000,000 is 7 per cent cumulative preferred and $1,500,000 is common stock, has incorporated the trade mark "Dowse-Durability," and this will appear on all of the company's products.

Automobile Issues React

War Conditions and Suggested Tax on Car Owners Form Bear Basis

NEW YORK, June 6—War conditions and the suggested tax on automobile owners incorporated by the Senate Finance Committee in the war revenue bill formed the basis for extensive raids on the automobile and allied securities at various times during the past week. Practically the only gains of any importance recorded were 12 points in Saxon, 4¼ points in General Motors common, 5 points in Fisk Rubber common and 1 point in Willys-Overland preferred. The other issues either showed a positive loss, some of them running from 2 to 5 points, showed a very slight gain or remained stationary. Activity was not very pronounced throughout the week although there were spasmodic attempts to arouse interest in a number of the specialities on which speculation is generally based.

The same conditions marking dealings in this city were reflected on the Detroit Exchange though perhaps in a more marked manner, there being very little activity and only two very small gains recorded.

Driggs-Seabury Changes Name

NEW YORK, June 4—The Driggs-Seabury Ordnance Co., Sharon, Pa., has acquired all the property and assets of the Savage Arms Co., Utica, N. Y., and has changed its name to the Savage Arms Corp.

Automobile Securities Quotations on the New York and Detroit Exchanges

	Bid	Asked	Net Ch'ge
*Ajax Rubber Co.	68½	72¼	—2½
*J. I. Case T. M. Co. pfd.	85	86	— ⅛
Chalmers Motor Co. com.	7	11	..
Chalmers Motor Co. pfd.	..	..	..
*Chandler Motor Car Co.	89½	92	—3
Chevrolet Motor Co.	95	100	—5
Fisher Body Corp. com.	34	38	..
Fisher Body Corp. pfd.	88	90	— ½
Fisk Rubber Co. com.	78	80	+5
Fisk Rubber Co. 1st pfd.	103	106	..
Fisk Rubber Co. 2nd pfd.	92	95	..
Firestone Tire & Rubber Co. com.	125	129	—5
Firestone Tire & Rubber Co. pfd.	106	108	..
*General Motors Co. com.	104¼	104¾	+4¼
*General Motors Co. pfd.	87½	88	— ½
*B. F. Goodrich Co. com.	52⅜	52¾	— ⅛
*B. F. Goodrich Co. pfd.	107¼	108½	+1¼
Goodyear Tire & Rubber Co. com.	200	210	—7
Goodyear Tire & Rubber Co. pfd.	106	108	..
Grant Motor Car Corp.	3	6	—1
Hupp Motor Car Corp. com.	3	4	..
Hupp Motor Car Corp. pfd.	72	80	..
International Motor Co. com.	6	10	—1
International Motor Co. 1st pfd.	35	50	..
International Motor Co. 2d pfd.	10	20	..
*Kelly-Springfield Tire Co. com.	51	53	..
*Kelly-Springfield Tire Co. 1st pfd.	87	94	..
*Lee Rubber & Tire Corp.	18¾	19¼	+ ¾
*Maxwell Motor Co., Inc. com.	49¾	50½	—1½
*Maxwell Motor Co., Inc. 1st pfd.	66¾	67¼	—1¼
*Maxwell Motor Co., Inc. 2d pfd.	31½	33	— ½
Miller Rubber Co. com.	200	205	..
Miller Rubber Co. pfd.	104	106	..
Packard Motor Car Co. com.	..	150	..
Packard Motor Car Co. pfd.	96	99	..
Paige-Detroit Motor Car Co.	29	31	+ ½
Peerless Truck & Motor Corp.	15	16	..
Portage Rubber Co. com.	150	160	..
Portage Rubber Co. pfd.	..	..	..
Regal Motor Car Co. pfd.	..	20	..
Reo Motor Car Co.	29	31	+ ¾
*Saxon Motor Car Corp.	52	55	+12
Springfield Body Corp. com.	52½	57½	..
Springfield Body Corp. pfd.	110	117	..
Standard Motor Construction Co.	12½	13½	— ½
*Stewart-Warner Speed. Corp.	73	75	—1⅝
*Studebaker Corp. com.	81¾	82	—4⅜
*Studebaker Corp. pfd.	101	103	..
Swinehart Tire & Rubber Co.	65	70	..
United Motors Corp.	29¼	29½	—1⅞
*U. S. Rubber Co. com.	60⅜	60¾	+3⅜
*U. S. Rubber Co. pfd.	105½	107¼	+ ¼
*White Motor Co.	46	47	..
*Willys-Overland Co. com.	29	29¼	— ¾
*Willys-Overland Co. pfd.	94½	95	+1

*At close June 4, 1917. Listed New York Stock Exchange.

OFFICIAL QUOTATIONS OF THE DETROIT STOCK EXCHANGE

ACTIVE STOCKS

	Bid	Asked	Net Ch'ge
Auto Body Co.	..	29	..
Bower Roller Bearing Co.	34¼	36	..
Chevrolet Motor Co.	..	..	..
Commerce Motor Car Co.	..	..	..
Continental Motor Co. com.	7⅝	7¾	..
Continental Motor Co. pfd.	..	..	..
Edmunds & Jones com.	..	..	..
Ford Motor Co. of Canada	..	230	..
Hall Lamp Co.	..	..	..
Hayes Mfg. Co.	..	..	..
Michigan Stamping Co.	..	15¼	..
Motor Products	..	..	..
Packard Motor Car com.	..	..	..
Packard Motor Car Co. pfd.	..	98	..
Paige-Detroit Motor Car Co.	29¾	30½	+ ¼
Prudden Wheel Co.	24¼	..	+ ¾
Reo Motor Car Co.	29¼	29½	— ¼

INACTIVE STOCKS

Atlas Drop Forge Co.	38	41	..
Kelsey Wheel Co.	..	40	..
Regal Motor Car Co.	..	26½	..

The Automobile

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The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907.

Working Tractors

JUST as it is up to the automobile industry to produce tractors to relieve the food situation, so is it up to the same industry to operate those tractors. It may not be the part of the manufacturers, but it is work that some section of the trade must make their special care.

We cannot now afford any sort of waste, either of material or time, but especially time in agriculture, because time is the equivalent of material. We cannot expect the farmer to use tractors to best advantage unaided. To merely make tractors and sell them would be to leave half the work undone. We must make them and run them too till such time as the farmer has acquired the knowledge and the men to look after the running himself.

Wanted Organization

To take charge of tractor operation there must be a national organization. It must be centralized, properly controlled and efficiently managed so as to avoid the overlapping and inevitable waste of sporadic individual effort. We must mobilize every man whose duty now lies in mechanical work on the land; and there are many thousand such.

There is no better work for a mechanically adept man just now than to help keep running the machinery upon which modern agriculture depends. It is not only tractors, but all other sorts of machines as well that need mechanical attention, though the farmer needs more assistance with the tractor than with anything else.

There is nothing the automobile industry cannot accomplish once it sets its hand to the plow; all we need is a leader or an organization which will take the place of a leader.

Army Truck Rating

CHANGING the rating of the military trucks to Classes A and B instead of giving them a capacity rating far below the actual load has removed the industry's principal objection to the specifications. It is now freely realized that the Class A truck is commercially a 2½ to 3-ton chassis, and the Class B a 4½ to 5-ton job.

A very general criticism that remains is that the engine size, 312 cu. in., is needlessly large for the Class A truck, and it is frequently stated that this will make the vehicles wasteful of fuel. It is pointed out that the European armies are quite satisfied with much smaller engines, and that it therefore seems too much cognizance has been taken of Mexican border experience.

While the subject is admittedly debatable, it may be doubted whether the idea that fuel consumption and engine size go hand in hand will hold at the present date, and there is a factor to be considered which is far from negligible. If it becomes necessary to run these trucks on kerosene, or on heavy fuel of a similar sort, either the compression must be reduced, as it could be by new pistons, or water injection employed, or the mean effective pressure reduced by some other means.

This may very probably have to be done in France, and if so then the American trucks with their large engines would be far better able to endure the change than the European machines. It must not be forgotten that the latter have better gasoline.

Manufacturers' Opportunity

WHILE all manufacturers are particularly desirous of maintaining their working force during the war they have a good opportunity of lending their aid through their entire organization by encouraging their employees to subscribe in the Liberty bond issue. In the present war it is as essential to have great, healthy manufacturing industries as it is to have a well-organized army. Those men staying at home in the factories will be earning good wages and should subscribe to the financing of the war, which can be done through Liberty bonds.

Manufacturers should call their workers together and advise them as to ways and means for purchasing their bond. Some factories are actively co-operating by handling the work connected with the deal. The money is taken out of the weekly pay-roll and held until the amount of the bond is reached, in the meantime the workman being paid 3½ per cent interest on his savings by the company. When the amount of the bond is collected the bond is delivered to the worker. If your factory has not taken any action in this matter it should be done at once.

WAR Is Our Business To-Day

We Must Organize All the Industrial Powers of the United States to Meet Present Crisis—This War Must Be Fought on the Savings of the Future

Lesson in Thrift Learned in Financing This Struggle Will Become a Great National Asset

By Frank A. Vanderlip
President National City Bank

WE have got to organize this nation for a new business — the business of war — and the business of war is no longer merely the business of soldiers, the business of fighting in the trenches; it is the business of the organization of all the industrial powers of the nation. That includes the financial powers; it is doing just what this meeting is significant of—getting men to understand that we are all combatants; we do not have to wear khaki; we are all in this fight, and our success is going to be measured by the completeness of the national organization, by the devotion of the whole people to this one business of war—not to their business as it used to be, but to their business as it is to-day, because their business is war.

¶EDITOR'S NOTE—Mr. Vanderlip delivered the accompanying address before a gathering of 109 editors of business publications of the United States at the New Willard Hotel in Washington, recently. His message is of vital importance to all our industries and to the automobile industry in particular because it clearly defines the trends in business to-day and outlines definitely the steps necessary to meet the new conditions.

There, naturally, I should speak of the financial side. We are facing the biggest financial operation that was ever undertaken. The Government has authorized the issuance of $7,000,000,000 of securities. Now, you do not know what $7,000,000,000 means, I do not believe—I know I do not, and I have tried to think of it a great deal. It is the largest sum that we have ever had to attempt to think of, concretely. All the money in all the savings banks of the country is $5,000,000,000. All the stocks of all the railroads in the country are $8,700,000,000. All the money in all the bank vaults of the country is less than $2,000,000,000—less than the amount that we have got to raise right now. Well, how are we going to raise it? If there is not that much money, where is it coming from? That is a natural question. Of course, we are very rich; we are a country whose wealth is estimated at $250,000,000,000, but what is it? It is farms and homes and railroads and factories—the instruments of transportation and production. You can not subscribe a railroad to this bond issue, or a house and lot; you have got to subscribe money.

Now, get clearly in your minds that everything that you and your forefathers have saved is now in fixed forms of wealth; it is in the farms and the railroads and the factories. There is a little margin that you may call "idle capital"; it is not really idle; it is on deposit in a bank, and has been loaned by the bank. That is what the bank is for. If there should be any great amount of calling of deposits from the banks, or calling of deposits by savings bank depositors, we would be in trouble; we would have contraction; we would have efforts on the part of the banks to liquidate their investments. We cannot invest this money over again which we have once invested. There has got to be another plan.

We have got to recognize that this war must be

fought not on the savings of the past, but the savings of the future; but the savings of the future are in the future, and we want money now. Well, the answer to that difficulty is an expansion of banking credit. That is the way this loan is going to be placed. You see examples of that in the action of a manufacturer who says he will take $1,000,000 of bonds and carry them for his employees, and let them pay in monthly instalments, and he goes to his bank and borrows on those bonds.

All Must Borrow on Savings

There is a typical example of how war must be financed, and exactly the same principle applies to the millionaire that applies to the wage earner; he must borrow in advance of his savings, and liquidate his loan as his savings accumulate; and the richest man in the country ought to be the largest borrower, and everybody ought to borrow according to his ability to liquidate the loan. That is the whole philosophy of financing a war; you finance it out of the savings of the future. The savings of the past have been invested. To anticipate the savings of the future you expand bank credits, and that is the course I believe that we are going to pursue; we are going to see an expansion of bank credits about equal to the loans that will have to be floated. Then we will see a gradual liquidation of those loans, as the savings of the future accumulate.

We have got a more difficult job, in one way, than England had. We are absolutely self-contained now, financially; there is no place to go. Whatever is done, we must do. England had a billion and a half loaned on farm bills, that normally and naturally mature; she sold two billions of securities to America. There were outside resources. There are none with us, because we are now the court of last resort, financially speaking. So whatever is done here must be done, it seems to me, in the way I have indicated—by anticipating the savings of the future, and creating bank credits in the meantime to take their place. That indicates that people must borrow, but the borrower must repay, and there is going to be a great lesson for America—a lesson of thrift; the lesson we needed, perhaps, as much as anything else. We had come to be a nation of pretty reckless spenders. We had been enjoying great prosperity and what came easy was going easy. We are going to see now that we must economize; that we must have savings for the future if we are to liquidate this indebtedness that will be created by this war. That is going to be a lesson of tremendous importance to the whole nation.

Learning Lessons of Thrift

If we can interest millions of people—and it ought to be millions—in this loan—if we can make them anticipate their future savings, and help them contract habits of thrift, if we can teach them something of investments through this, we will have opened perpetual springs of wealth that will yield as much to this country almost yearly as we will pay in the expenses of this war. There is one of the great by-products of the war which will be on the credit side of the ledger.

But economy strikes a chill to people; they say, "That is going to ruin business; if men are going to buy as little as possible, business is going to be bad." Not at all. Business is going to be different, and is going to be more active than you have ever seen; but it is going to be a business of necessities. You cannot give this Government $7,000,000,000 of purchasing power and expect to have as much purchasing power left yourselves as you had before. You are doing an absolutely unpatriotic thing when you spend money on an unnecessary thing; and that is true, no matter how much money you have, how easy it is for you to make the expenditure. This unpatriotic conduct consists not alone in your devoting money to that unnecessary thing that you might, let us say, devote to this Liberty Loan—that is not it; it is in your employing labor on unnecessary things, when the Government, directly and indirectly, in the organization of the nation, which is necessary, is going to need all the labor that there is.

Business Will Break All Records

We are going to see the most intense period of industrial activity that was ever known; it will not be 100 per cent; it will be 125 per cent; they will be employing women and youths, and they will be employing unskilled men for more, highly skilled work, and there will be that expansion and development that we have seen in European nations, and we will have the most intense activity and the greatest wage scale that we have ever known; but it will be a different kind of business. It must not be a business of unnecessaries or of luxuries; it must be a business of war. That must be in the thoughts of the people.

"But," you say, "this will throw people out of employment, dislocate industry, disorganize commerce." Yes, it will. War is not tiddledewinks; it is serious business, and you cannot have war without some worry. But that is not a reason for serious worry; you are not going to throw any person out of one job into unemployment; you will throw them out of one situation into another, where there are two jobs waiting for them. There will be merely a transfer of business. If a man is engaged in a business which is purely a luxury, it should be disorganized, for the time being, and he should welcome it as a patriotic duty; but if he is engaged in a mixed business—part necessary and part luxury—the necessary part of his business will increase so that he can well afford to let his business in luxuries decline. We are going to have great business; we are going to have, as a result of the method by which this loan must be made, a great increase in deposits; we are going to have an intense increase in industrial activity; but we must all get together for this national effort of organization, and we must say, if it pinches here and there—if a man is thrown out of employment because there is less business in a luxury, he must take that discomfort philosophically. Other jobs will be waiting for him.

Now, we have got to have savings, and we have got to have savings not only of the wage earner, but of capital. There has been in some people's minds—I think it is pretty well dissipated now—that the Government could spend the same amount of money three times; first, by buying for less than a thing was worth—buying below the market; second by taxing away all the profits, if there were any profits left, and, third, by getting us to subscribe to bond issues. You cannot do that. We have got to have prosperous business if we are going to have the power of accumulation to furnish the finances to fight this war.

It would be a disaster next to a great German victory to have disaster to our business structure, because if that came, we could not go on with the war. Remember, we have got to finance not only ourselves, but it is just as important to finance all purchases of the Allies in this country. We are doing it on a wonderfully patriotic basis, when we give to them this huge credit at the same rate of interest that we have raised the money on a tax-free obligation. We ought to keep that clearly in mind; we are performing a great service in giving them the money at the rate that we raise it on a tax-free obligation. I believe it is the right thing to do, and we have got a huge sum to raise for the purpose, and in calculating the percentage of expenses to be raised by taxation, we ought to deduct everything we are loaning to the Allies; we should not be taxed in order to raise a fund to loan; we should have that percentage calculated on the base of what we are going to spend for our own Government; not the aggregate of what we are going to loan all the other governments to spend.

Avoid Discouraging Taxes

People like to escape taxation, of course; but really I believe there is the most patriotic desire to pay all the taxes that it is wisest to lay upon the business of the country. I do not encounter any hesitation on that score at all; but it is not wise to lay on the business of the country a discouraging tax. We must have prosperity in order to do this trick, and we must not discourage business by taking all of its profits away while we are fighting the war. Put a great burden on this generation; yes, but do not put it on it right at the first moment of the war; continue it after the war, if necessary.

Now, we are not playing at war; this is not any child's game; we are not carrying wooden guns, and we have got to have the most sincere effort, the most complete co-ordination of effort that it is possible to obtain. I think too many people as yet believe we are in a sort of paper war; that any real fighting is hardly on the program; that Germany is pretty well whipped already; that, in any event, it is a war on another continent; that it is a long ways off; that the German armies are surrounded by the greatest military forces that ever collected; that it is months before we can really get into it; and that, probably, before that time, it will all be over. Do not believe it, or, at least, do not act on that theory. There are contingencies possible—I do not believe they are probable—that would put a very different phase on this situation at an early date.

Who knows what the future of Russia is going to be? I do not. I do not believe anybody in this country does. I do not believe anybody in Russia does. You have got forces there that you can hardly measure. We have already seen that it has, in a measure, paralyzed the military forces. I believe that that is the worst that is going to happen, and that we will see improvement rather than any greater disaster. It is conceivable, however, that we might have a separate peace. Now, I do not believe we will, but that is conceivable. Let us see what it means. It means the withdrawal of all the forces on the eastern frontier, and they have already been largely withdrawn, I believe. It might mean the return to the active ranks of 1,500,000 prisoners who are now in Russia. That would be quite an augmentation for the forces. It might mean an opening of the food stores of Russia. With all that new advantage we might see a war that would look quite different from even the present serious situation.

Benefits from the War

There is a life and death struggle in the waters around England. That U-boat problem must be solved; if it is not solved, England will go hungry, and no matter how rich a nation is, or how brave a people, they cannot fight if they cannot eat.

I do not think either of those very serious contingencies is written in the future, but they are possibilities, and they ought to make us view clearsightedly the fact that we are in a real war—a war that we must prepare for to the full extent of our ability, a war that must measure our whole co-ordinated forces, our moral forces, our industrial forces and our financial forces. But I am not pessimistic. I see some wonderful by-products to come out of this war, that are going to be written on the credit side, and I am not sure but what they are going to greatly overbalance anything that they cost us. We will learn this lesson of thrift, of which I have spoken; we will open permanent springs of wealth, if we can get millions of people into these habits of thrift. We are going to get another thing, besides learning lessons of economy—and those lessons will be taught to everybody, wage earner and millionaire—but we are going to learn another lesson; we are going to learn that we are fighting for a very valuable thing—Democracy—and that is what this fight is for.

We are fighting for Democracy, but we are going to learn from the conduct of this war that there are beauties to Democracy. We are going to see inefficiency developed. There is not any doubt of that, and it is impossible that it should be otherwise; but the experience of that inefficiency is going to make every citizen see that he has duties of citizenship, and make him see it more clearly than he has seen it before. One of the great by-products of the war is going to be that we will not only secure to civilization the permanency of Democracy, but we will ourselves recognize our duties of citizenship under a Democracy.

Must Supply Farm Mechanics

Automobile and Tractor Industry Must Discover, Train and Organize Army of Skilled Operators for Farm Machinery

By A. Ludlow Clayden

THE design and manufacture of the right sort of tractor is, perhaps, hardly more important than the development of a proper system of selling and handling tractors after they leave the factory. The nature of the service to be allowed for is especially important, because it reflects right back to the drafting board. If the engineer can rely upon even occasional intelligent examination he can do a few little things which make for efficiency that he might hesitate to do otherwise.

Farms Need Mechanics

Looking far into the future, perhaps not so very far either, there is no doubt that farmers and farm hands will be much more mechanical than they are now. The more mechanical power used on farms the greater will be the number of real agricultural mechanics. There is room for a new breed of man here; you see the nucleus thereof at tractor demonstrations, perhaps. Now the necessity for creating a force of many thousand farm mechanics, fit to care for tractors and other machinery, is very great. It is not too much to say that all agricultural machinery is less efficient than it could be because of the very unskilled labor which is the best the manufacturer can expect will use the machines. To breed a race of real mechanics for the farm would speed up agricultural production greatly, it would cut costs and make improvement general all along the line. In a word, the race *must* be created. The world needs it and must have it with all possible speed.

It is up to the makers of agricultural machinery, especially of tractors and engines, to create that farm-mechanical breed as quickly as possible.

Service Must Be Readily Available

Turn back a moment. For this year and next we must make tractors and we must run them. The tilling must be done as it was never done before. If high prices must be paid for labor of the mechanical sort the fact must be faced. There is no escape. This means that whether he wills it or not the tractor maker must organize a fairly costly and a quite extensive service system. It need not be free service, but it must be readily available service.

It need not be a service system peculiar to each manufacturer, it might be organized in many ways, but however it is done the country from coast to coast *must* have a good many thousand men scattered throughout, each capable of getting a farmer out of difficulties caused by his ignorance of machinery, especially of tractor construction.

It seems that it is the bounden duty of everyone who can help to form such an organization to do his best to forward it; to sacrifice personal advantage if need be in order to keep the wheels turning.

We have in America many thousands of mechanics of the sort required. They are now either:

1. Doing the sort of work they should be on farms.
2. Working in tractor or implement factories.
3. Working in garages and repairshops.

The first class are on the job. The second class should not be disturbed. The third class must be mobilized in some way so that it can be concentrated on agricultural work at the times when the latter is of paramount importance.

To Provide Tractor Operators

Confining ourselves to tractors only, it is a fact that for every tractor sold an operator has to be found or created, and at the present time of stress it is not right that the production of the operator should be neglected any more than the production of the tractor. Either an operator must be supplied with the tractor or training for an operator must be supplied, which amounts to much the same thing.

Nor can too much reliance be placed upon the agricultural labor market for the supply of men to be trained. Certainly every tractor produced means that more work can be done without increase in man power, or the same work with less man power, but let us not forget that we have to do a great deal more farming. Every man released from one farm by the introduction of a tractor must get to work on another farm. We have got to put more men on the land. Let us supply the trained, mechanical men in so far as we are able.

THE SERVICE WHICH TRACTOR MAKERS HAVE GOT TO GIVE IS SERVICE TO CIVILIZATION, rather than service to their customers individually. They must do their best to insure that each machine operates at as nearly as possible 100 per cent efficiency. Their best will be the provision of proper operators in proper quantities. Let them see to the collection, the training and the distribution of mechanical farm labor and the amount of

the conventional kind of service they will have to render will be negligible.

How is it to be done? The complete answer will have to be worked out step by step, but several things stand out clearly.

First, the existing link between the manufacturer and the farmer is the dealer. Whatever the manufacturer does for the farmer the dealer is the natural channel of communication.

Second, the dealers in automobiles, in trucks and in agricultural machinery employ between them nearly all the men who could quickly be made efficient farm mechanics.

Third, there are organizations of dealers and of manufacturers of a powerful and National nature.

Fourth, to get together on big problems is possible right now in a way it seldom was before and never will be again.

Dealer Is Connecting Link

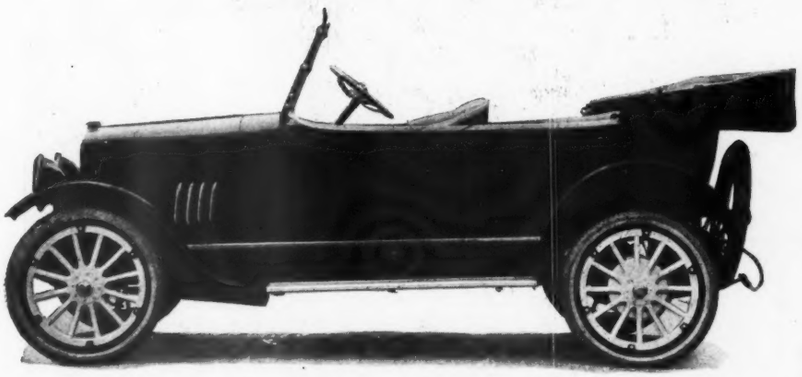
Is it not the logical answer that the proper way to perform this "service" is for manufacturers' and dealers' associations to make their plan and pull together? There must be controlling hands, what better than those of the organizations which have done so much for the prosperity of maker and dealer and have benefited the ultimate consumer by creating a better type of business man for him to deal with?

Solving the Farm Labor Problem

The men who handle tractor and implement sales efficiently are the men to handle this great labor problem, and in handling it they will be doing a service that could not be overestimated.

After 3 years of war England has organized all the mechanical resources of farming in the country. It has been done by government and the men in charge are those who have made big names in the automobile industry, because they are manifestly the best to handle so essentially a child of the automobile as is the tractor. In America a similar sort of control must come if government is not forestalled by private enterprise. The makers and dealers through their associations and societies can do more than the government could do; they can do it in a tenth of the time. THEY CAN START NOW.

Gem Car and Light Delivery Vehicle Mounted on Same Chassis



Gem five-passenger touring car which sells for $845

A TOURING car and a light delivery wagon mounted on the same chassis have been brought out by the Gem Motor Car Corp., Grand Rapids, Mich. The touring car is a standard design and the light delivery wagon can be secured either as an open express wagon, with a canopy top, or as a full panel job for city delivery. The price of the touring car is $845, f.o.b. Grand Rapids, and of the delivery wagon it is $675 as an open express, $700 with a canopy top and $725 with a full panel.

The specifications of the new car show it to be assembled from standard units. The engine is a Golden, Belknap & Swartz; carbureter, Carter; electric lighting and starting system, Dyneto; clutch, Golden, Belknap & Swartz; gearset, Grant-Lees, and the axles, Walker-Weiss. It is fitted with a Lavine steering gear and a Stewart speedometer.

The power plant is a four-cylinder, 3¾ by 4¼-in. L-head block, giving a unit with three-point suspension. The camshaft drive is by silent chain, and lubrication is by circulating splash, with a piston type pump.

The electrical system comprises a starting and lighting outfit operating at 6 volts and a battery ignition system working in connection with a Detroit 6-volt storage battery having 80 amp. hr. capacity.

The drive is taken from the engine through a Golden, Belknap & Swartz plate disk in oil clutch to the three-speed selective gearbox. The final drive is a bevel gear system with the propulsion and torque taken by the Hotchkiss drive method through the rear springs. The reduction in the rear axle is 4 to 1, and the tires are 31 by 4 in. Millers. The wheelbase is 112 in.

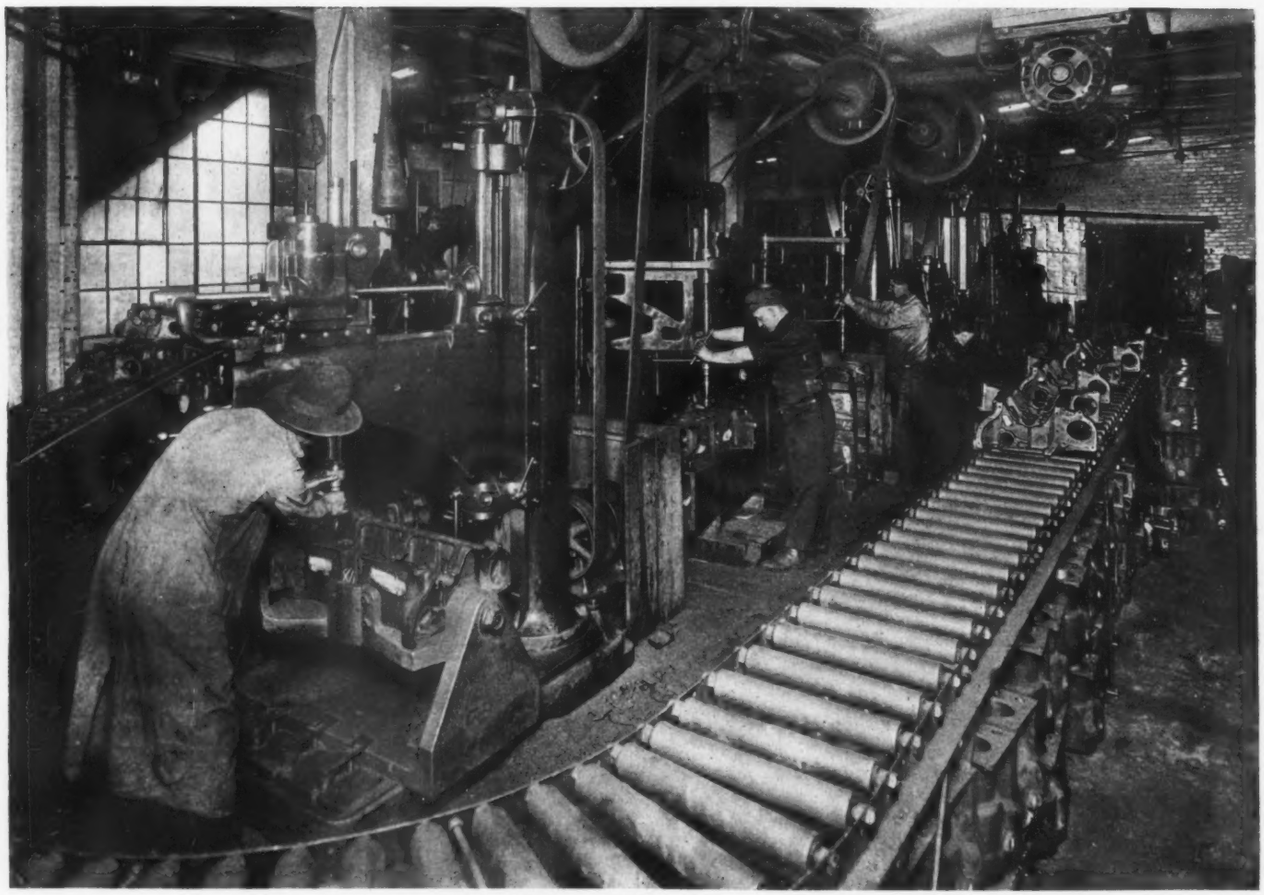
Gem delivery wagon mounted on the same chassis as the touring car

Movement Minimized *in* Building Hupmobile Engine

Part I

Travel of Parts Follows Concentric Plan, with Finishing Point Near Start—Two Main Divisions, One for Light and One for Heavy Parts

By J. Edward Schipper



Drill and tapping section of Hupmobile engine plant, showing the method of handling crankcase by gravity conveyor

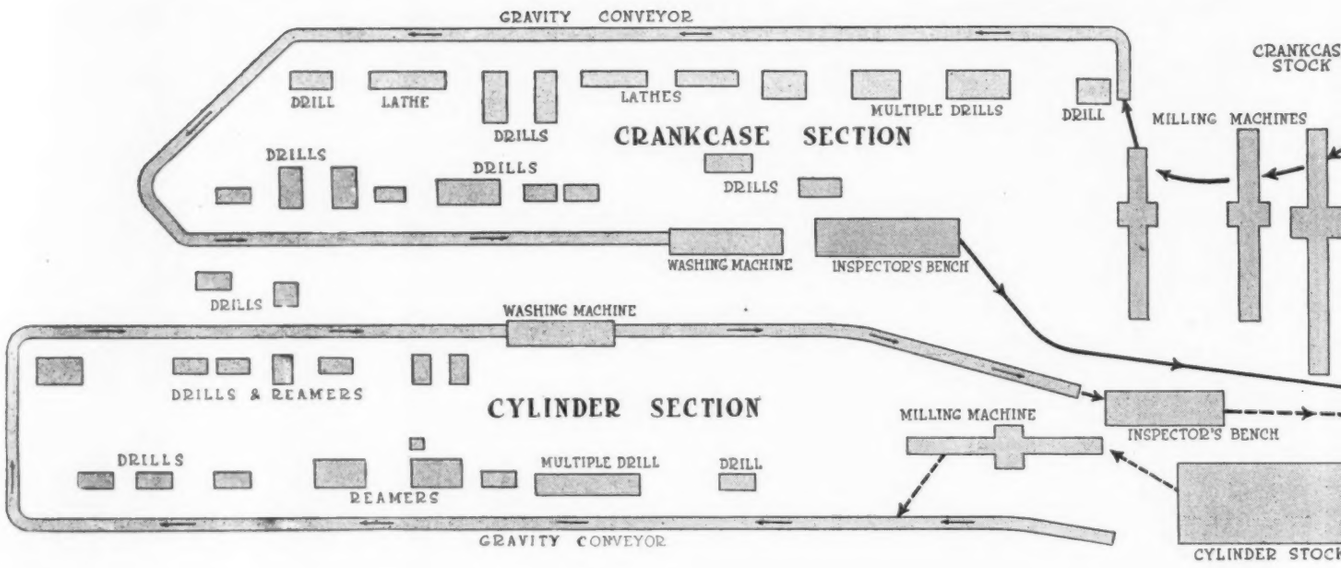
THE main thought in the layout of the engine manufacturing portion of the factory of the Hupp Motor Car Co. is to route each part through its machining and assembling so that the aggregate distance traveled by any part is a minimum. It is necessary to maintain the progressive movement from one floor to another, and to conduct inspection with the least possible interruption.

The travel of the parts follows a concentric plan, so that the finishing point for any part is adjacent to the starting point. This is accomplished by having the manufacture start at the center aisle of the machine shop floor and extend to each side and back, finishing again on the center aisle. This center aisle thus divides into two main divisions the entire layout of engine manufacture. These two divisions are entirely separate, and advantage has been taken of them to maintain one division for the two heavy parts, the cylinders and crankcase, and the other for the smaller parts.

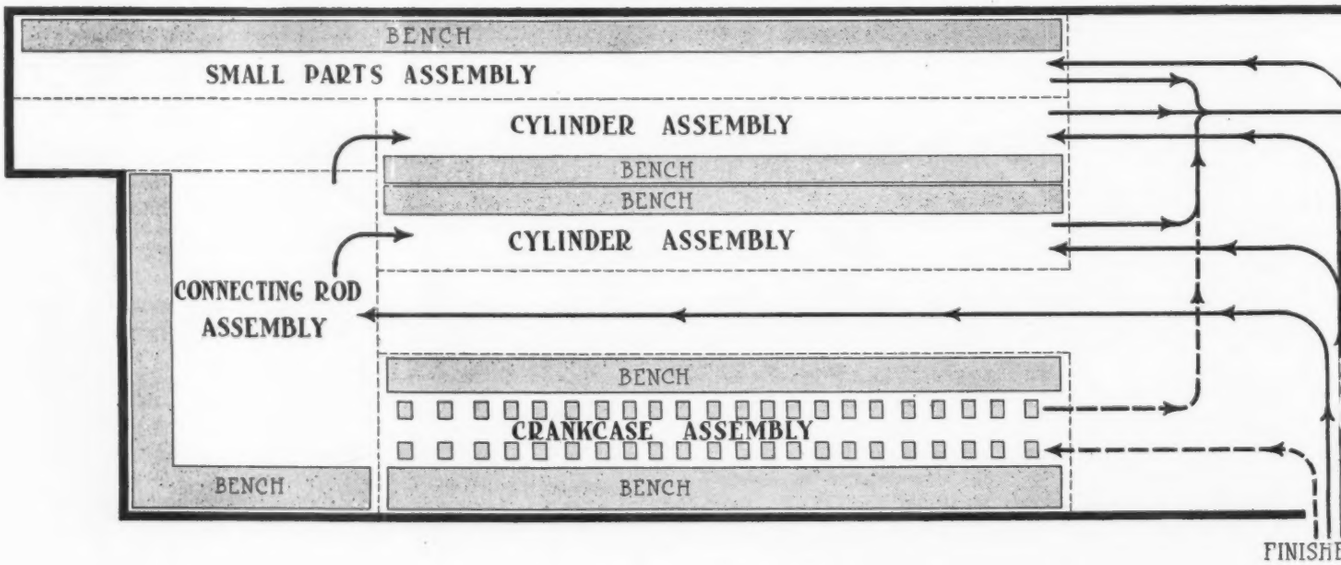
Generally speaking, this method of loop progression has advantages over the straight-line system, which

Lay out of Hupmobile Engine

Showing Progressive and Center-

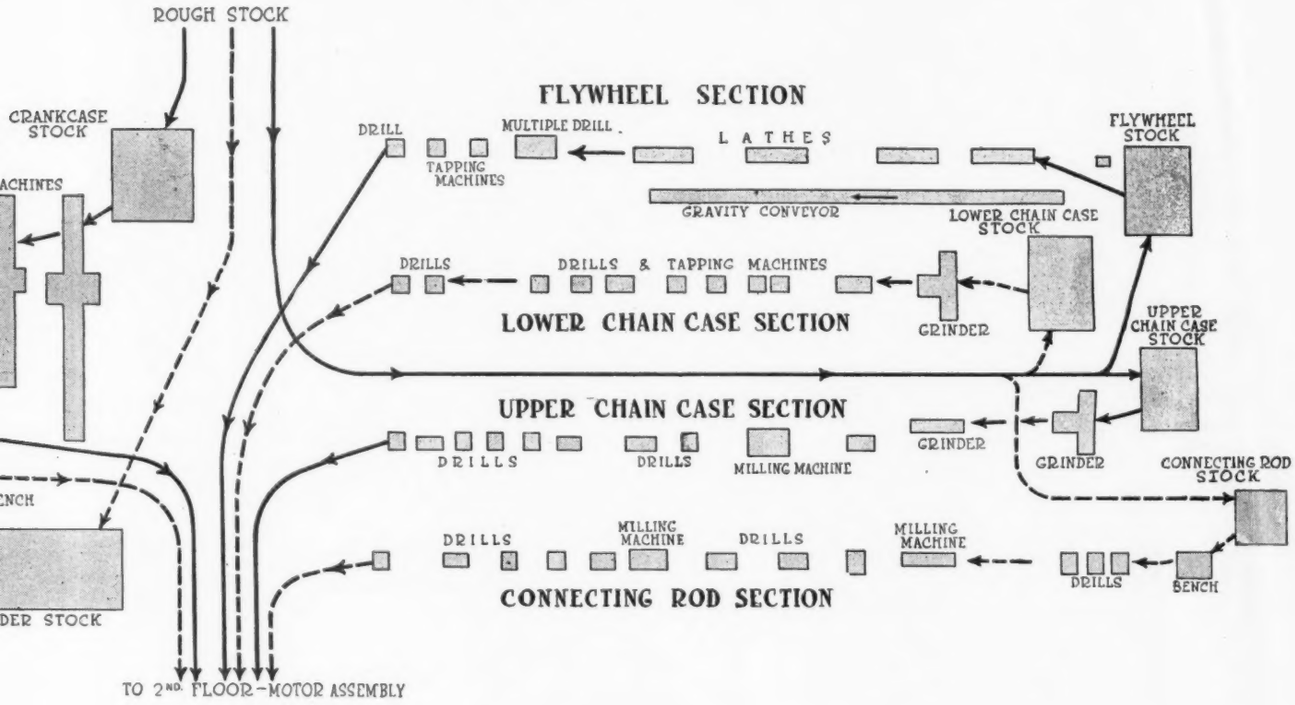


Hupmobile Assembly Room, Showing Loc
and General Progress

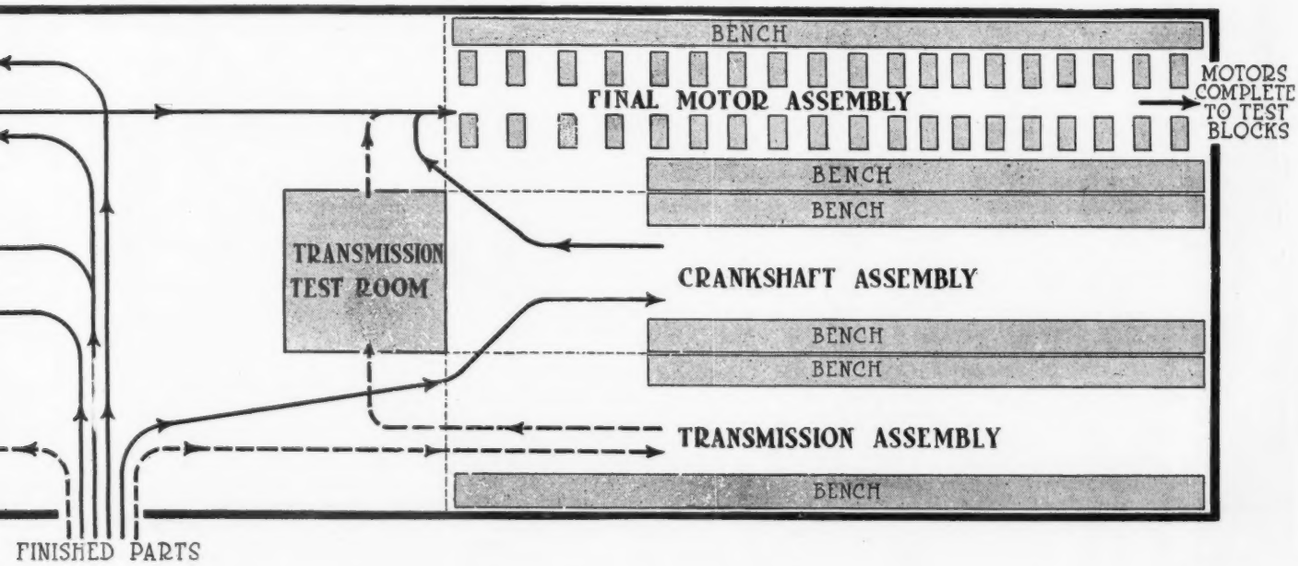


ne Manufacturing Department

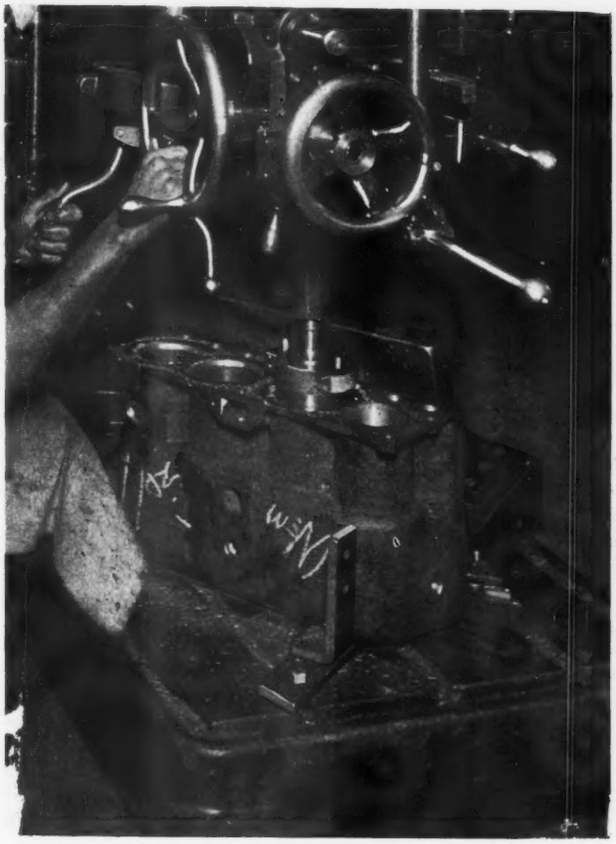
Center-Converging Scheme



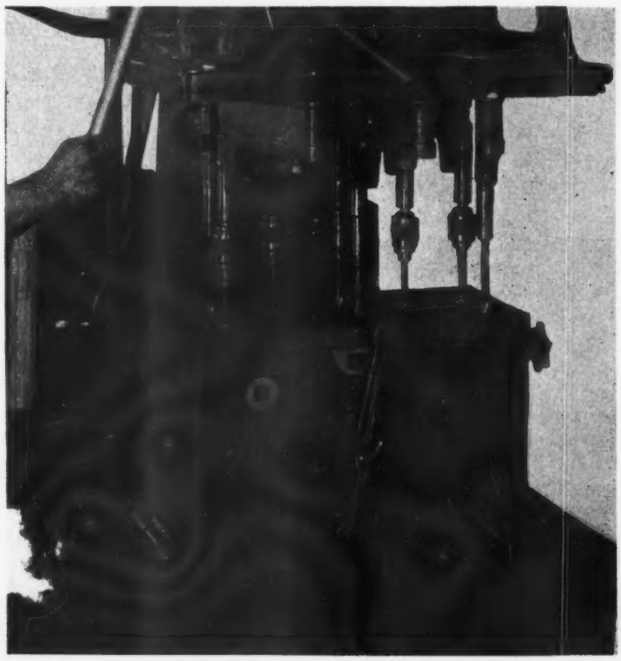
ng Location of Various Sub-Assemblies
rogressive Scheme



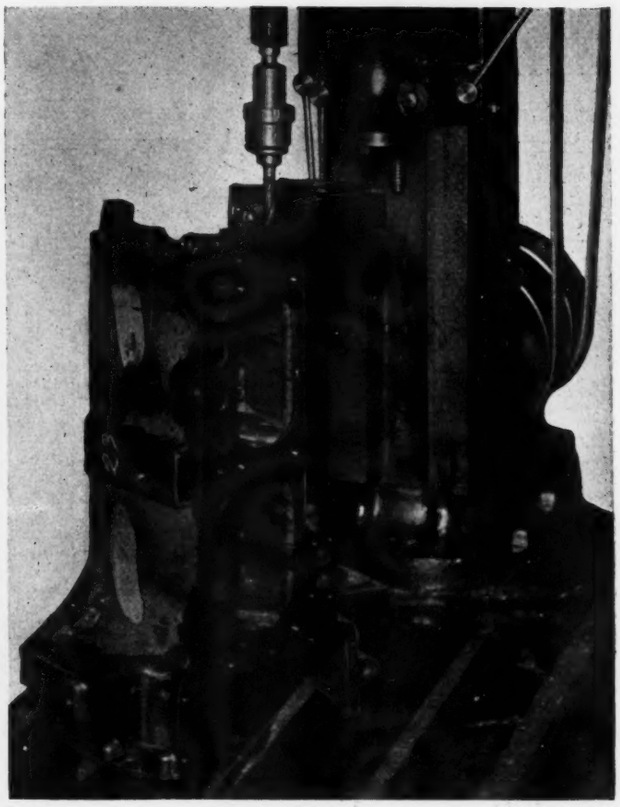
Machining Hupmobile Cylinders and Crankcase



Cutting piston clearance in bottom of cylinder by means of a double chamfering cutter



Cylinder drilling operation in which eight spindles are used. This is for drilling the holes in the bottom flange of the cylinder casting. Note the box type of jig and clamp



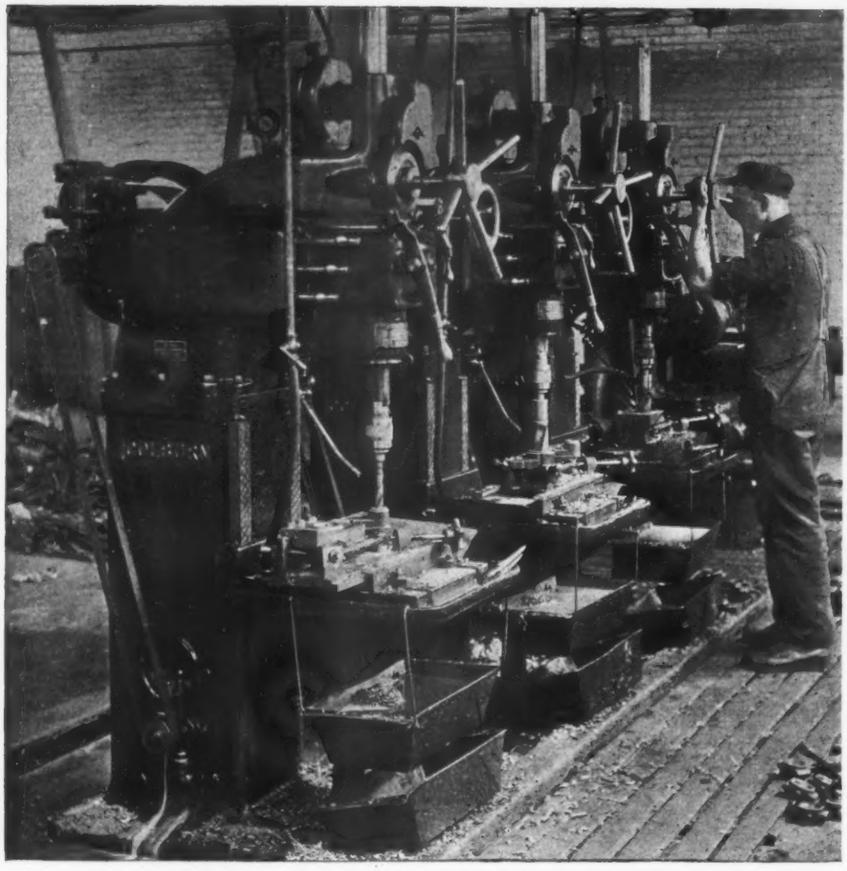
One of the drilling operations on the Hupmobile crankcase showing individual job on one end of the case

advantages are bound up in the fact that it is not necessary to carry parts, either in manufactured or assembled condition, any long distance. In the straight-line system where all the work is carried along parallel lines the small parts upon which there are fewer operations are finished along a shorter line than the larger parts, and of necessity must be transported in a finished state for a considerable distance. With the Hupmobile system, where the small and large parts are broken up by the introduction of a center aisle, it is not necessary to do this, and this fact should be borne in mind when studying the following description of the manufacturing processes at the Hupmobile factory.

Engine and Assembly Floors Separated

One point about the Hupmobile engine plant which differentiates it from others is in the separation of the assembly floor from the engine floor. This has advantages and disadvantages. It would probably not be as satisfactory if the progressive system of assembly were used. Here, however, there is a transformation from progressive to group work. The assembly of the engine is carried out by the group system, in which the work is done upon a fixed frame rather than upon a traveling frame as used in progressive work. Whether or not this is an advantage is doubtful and seems to depend more upon the quantity produced and the floor space rather than on the actual time to do the work. It seems as easy to drop the proper materials for assembly at the individual stand as it is to transport the entire stand with the engine attached. On the other hand, for economy of space, the moving stand, or progressive system, seems to have the advantage.

This descriptive article will naturally fall under three heads. First, the layout of the factory; second, the



Battery of drills working on connecting-rods. One machine rough bores the big end, the one in the foreground drills the small end and the other finish bores the big end

individual steps in manufacture; and third, the assembly work. In all three of these parts the point to be noted and the lesson to be derived will be in the study of how the transportation of material, either manufactured or raw, has been cut to the greatest possible extent.

Divisions Separated By Center Aisle

Referring to the factory map herewith, the two divisions in the manufacturing section are divided by a center aisle. On the left side of the plan the cylinder and crankcase operations are carried out. On the other side of the aisle the small parts are taken care of. The assembly occupies an entire floor.

The arrows on the accompanying map of the manufacturing floor indicate that everything in the cylinder and crankcase section starts at the center aisle and works out and back. On the small parts section the raw stock is fed from the end of the aisle furthest from the center aisle and works toward the latter, so that when the operations are completed and ready for assembly in both of these main divisions of manufacture, they are back on the center aisle and accessible to the elevator leading to the second floor where the motor assembly is.

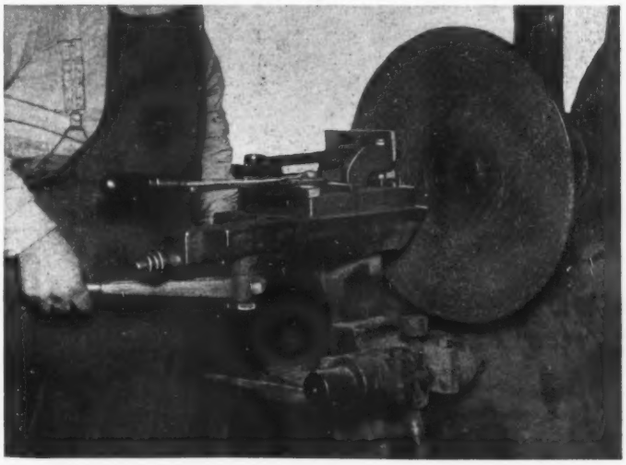
Concentrated Manufacturing

The breaking up of engine manufacture into these two parts accomplishes the result of a concentrated manufacturing scheme. While the progressive system can be maintained without an overlapping in travel, at the same time the length of the aisles is cut in half, and instead of having parallel lines where small parts having fewer operations must run parallel with large parts having more, it is quite possible to have the small parts with approximately the same number of operations close together. The inspection department can also be concentrated at the ends of the short lines, so that the system of inspection is greatly simplified by having the master inspection at the end of this line and the individual inspections during manufacture carried on by floating inspectors who check an allotted number of machines.

The law of continuous movement, which is fundamental in progressive manufacture, can be carried out by laying out the conveyors so that, although they move continuously, they do not necessarily move in a straight line. This is shown on the map, where on the cylinder and crankcase side the conveyors operate continuously by running out from the center aisle and back, forming a loop instead of a continuous line.

On the other side of the manufacturing floor in the section at the right, where the small parts are handled, straight lines are used running from the end of the aisle to the center, with the raw stock at one end and the finished inspection at the other, the result being that when the crankcases and cylinders come together with the small parts, such as the flywheel, chain cases, connecting-rods, etc., the entire sets of groups can be placed together and carried to the assembly room.

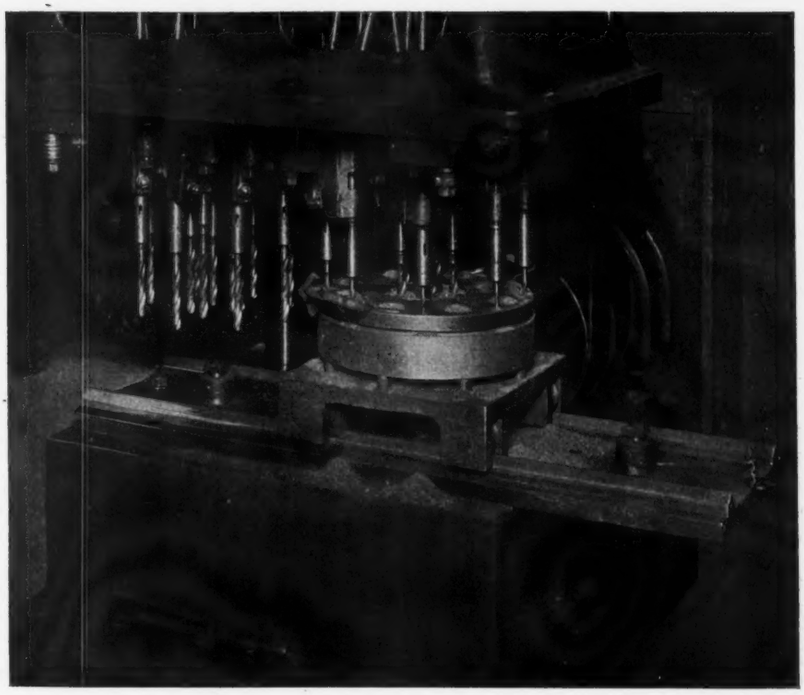
The method of placing the rough stock for both divisions of manufacture is exactly as would be indicated by the manufacturing layout. The rough stock for the crankcases and cylinders is piled at the end of the center aisle opposite to that which the finished parts



Grinding the surface of the connecting-rod lower and bearing faces after the cap has been cut off

reach on their way to the assembly floor. The stock for the small parts, such as the flywheels, chain cases, connecting-rods, etc., is piled at the ends of the aisles along which the machinery taking care of these individual operations is located.

Referring particularly to the section at the left, where the crankcases and cylinders are manufactured, by the use of the loop type of conveyor it is possible to put the machinery within the loop so that the field of operation on both the crankcase and cylinder sections is bounded by the conveyor taking care of that work. This gives a clearly defined area in which the manufacture of these two main parts of the engine are confined. The cylinder stock is brought in from the rough stock room and placed at the initial end of its gravity conveyor, and the crankcase stock is brought in from the rough stock room and placed at the point where its preliminary operations are made before it enters upon the gravity conveyor which takes it from machine to machine in its elliptical path from start to finish. By this means each department can be held as a separate unit without any possibility of the progressive operations crossing each other at any point. An essential particular in the layout of progressive jobs is that the lines of progression do not intersect at any point. Points of intersection are points of confusion, and though it is not possible in this factory to work in one continuous straight line from one end to the other, so far as manufacturing steps are concerned, there is no intersecting point in any department.



Drilling holes in flywheel and using a plate type of jig in place of the oven type used on the larger parts

The layout of the crankcase and cylinder departments consists in these two conveyor loops which bound the machines used in manufacture on both the outbound and inbound trips of the parts along the gravity conveyor.

Small Parts Layout Simple

In the layout of the small parts department, the study is still simpler. This, because of the fewer operations, becomes a straight-line scheme, with the individual parts passed from machine to machine until completed, at which time they have approximately reached the divided center aisle where the parts come together on their way to the assembly department.

In all cases the inspectors' benches are placed at the ends of the manufacturing line, each taking care of their own special jobs. For instance, the inspectors on the crankcase section are at the end of the gravity conveyor which the crankcases leave after they have been completely manufactured and have passed through an automatic washing machine which puts them into condition for inspection. These inspectors pass on the crankcases only, and as soon as they have made their final check the crankcases travel to the center aisle where they are ready to go to the assembly floor.

This same method applies to the cylinder section, with the inspectors at the end of the conveyor, from which the cylinders are taken after they have been passed through the washing machine.

On the smaller parts the inspectors are at the end of each of the parallel lines checking the work before it is allowed to go to the assembly floor.

In timing the work which goes through this layout, the small parts keep in step with the crankcase and cylinder production, so that there is always a proper number of each which meet one another ready to pass to the assembly floor.

Summarizing: There is a smooth progression in this part of the engine manufacture, in which the raw stock of the crankcases and cylinders is led to its individual loops, through which it passes, returning to the center aisle on the other side of the engine manufacturing floor; while the raw stock on the other side of the floor starts from the outer aisle and works down to the center by straight, continuous lines. This may be called a converging progressive scheme, embracing all the fundamentals of progressive manufacture without the straight-line principle.

The machine shop operations, including the machine work and jigs, will be dealt with in a succeeding article, and the progressive steps in manufacture and assembly in another.

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Texas Farmers Increase Car Purchases

WHATEVER falling off in automobile sales to the people of the cities and towns of Texas there may have been during the last few weeks has been more than made up by increase of orders for cars from farmers and ranchmen, according to the statements of dealers. It is stated that the bright crop prospects which now exist in nearly every portion of the State are serving as an incentive for a great many farmers to place their orders for automobiles. The cattle and sheep interests are also unusually prosperous at this time and the trade among these classes of pastoral people is larger than ever before.

The small decline in automobile sales in the cities and towns is believed to be due to a temporary depression or rather uncertainty which will be soon overcome. Industrial interests generally were never more prosperous in Texas. All lines of manufacturing plants are working full time, including the lumber mills, which had been in a state of partial stagnation for several months. The demand for motor trucks for industrial plants shows a marked increase.

Utilizing Automobile Experts

France Realizes Error of Sending Engineers and Race Drivers to Trenches—U. S. Should Draft Such Men Directly Into Automobile or Aviation Section of Army

By W. F. Bradley

PARIS, MAY 15.—At a time when America is recruiting an army it is of advantage to note what use France has been able to make of her specialists in the automobile industry. If advantage is taken of this experience it will help America to avoid some costly errors and to put men into their proper positions at the outset, instead of after 2 or 3 years of war.

For a long time the French army authorities refused to consider any other value than the military one a man possessed when he went through his preliminary training at the age of 18 or 20. Thus, such men as Michelat, chief engineer of the Delage company, filled an unimportant post in the fighting forces; Louis Wagner, twice winner of the Vanderbilt and professional aviator, went into action with the artillery; Jean Chassagne, fastest race driver in the world, sat behind a big gun in a fort on the Swiss frontier, and was not allowed to touch a car.

Called Back to the Factories

Gradually the defects of this system became evident to the official military mind, and chief engineers were called out of the trenches to control the factories that were standing idle for lack of their direction. This recall was only done gradually and grudgingly. When the order was given, some of the men had received their last call and some had been taken into Germany. Even now men who could be employed to better advantage are on the firing line.

Out of the last European racing team to visit America, one has been killed and another is a prisoner. Georges Boillot fell while fighting German airplanes at 7 to 1 odds. Mechanician Lally, who sat by the side of René Thomas when the Delage won at Indianapolis, is a prisoner working at the Mercedes factory in Germany. He was captured in the first onslaught, several months after his return from the States. The Boillot family has had to deplore the loss of another son, a younger brother of Georges, who fell while leading a charge. The third and only remaining son is an aviator at the front.

Arthur Duray, free from military obligations, volunteered for service in the French army. He was turned out of the recruiting offices a dozen times; but Arthur was persistent, and was at last taken in and made an automobile driver, which post he still occupies. Mathis, his mechanician at Indianapolis, was given a similar post, first with the French, then with the Belgians. Incidentally, he had to go through an automobile driving school after being transferred to the Belgian army.

Albert Guyot did 18 months' hard service as an automobile driver on the French front. As an old aviator he was transferred to the flying corps, was put through the schools as a matter of course, and later made an instructor. While engaged in machine-gun instruction over water his machine fell and went under. Guyot managed to work himself free of the underwater wreckage just when he had given up all hope of driving in any more automobile races. The fall injured his health, with the result that he has been in a hospital for several months, and probably will be discharged as unfit for further military service.

Jules Goux has done all his war work in the automobile service. After being a staff car driver, he was made an officer in the tanks. Joseph Christiaens fought in Belgium in the early months of the war; was a prisoner, escaped to England, came to America, and is now back in England at the Sunbeam factory. Jean Chassagne, after his experience on the Swiss frontier, was transferred to the Sunbeam factory and is now supervising the fitting of Sunbeam engines to French airplanes in France.

René Thomas, although he had never been a soldier, thought he was fit to drive an army car and volunteered when the fight began. As René has a slight limp, caused by a motorcycle accident, and the recruiting officer had never heard of Indianapolis or the first man to fly an Antoinette monoplane, the crack race driver was told to get out. He went, and discovered a little later that he could employ his Indianapolis winnings very profitably in helping to develop a little garage into a big factory. The factory is still growing, and Thomas is still controlling it.

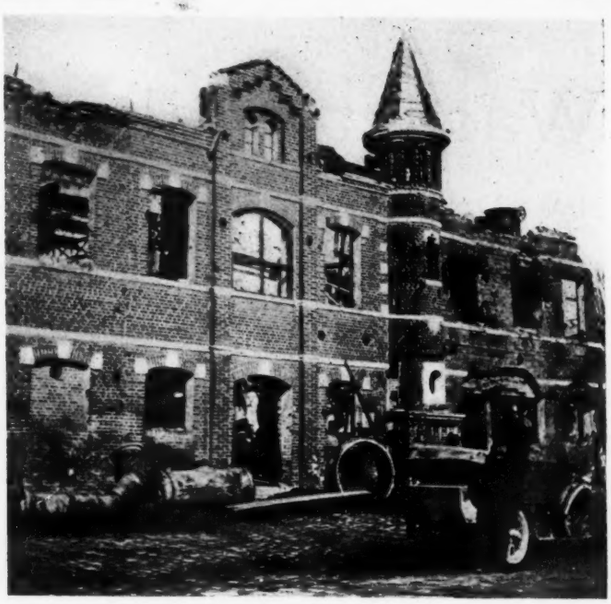
Louis Wagner, after experience as an artilleryman and later as an automobile driver, was sent to the airplane factories at the rear. He is now helping to build airplanes for the Darracq company, the firm with which he had his first racing successes. The Italian drivers Nazzaro and Lancia are mobilized at their own factories; Cagno, Scales and Fagnano are on army work at the Fiat shops.

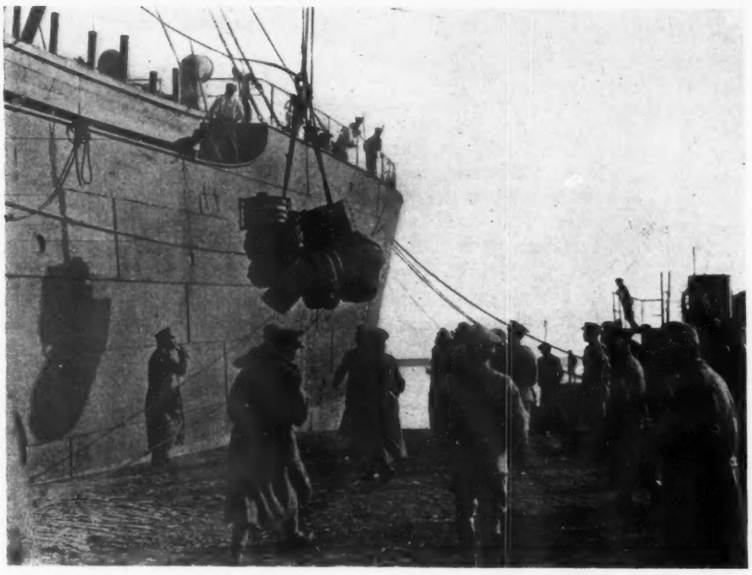
Charles Faroux, editor of an automobile paper and race manager, drove a staff car for a year and now is an engineer at the government aeroplane-engine test shops. Henry Fournier, old-timer, who raced in America in the De Dion quadricycle days, is running a munitions factory. The Sizaire brothers, after serving in the army automobile service, were returned to their factory to produce airplane engines and other war material.

The lesson is obvious: Every man who has proved a success in the automobile industry should be drafted direct into the automobile or aviation service of the army, irrespective of his physical ability to undertake active service with the infantry or other combatant forces. It has taken the Allied armies nearly 3 years to learn this lesson.

News from "The Automobile"

The 100,000-odd automobile drivers in the French army possess an automobile newspaper which is written, edited and made up entirely in the war zone. The publication, which is one of the best yet seen in France, is entitled *L'Automobile aux Armées*, and has in each issue at least two pages of foreign news, in English and French, taken from THE AUTOMOBILE and *Motor Age*.





Rebuilding Northern France

At the upper left are illustrated some of the motor trucks transporting material for building temporary houses in the region devastated by the Germans before their retreat

Above—Scout car in the midst of the ruins of Noyon, a large part of which town was completely wrecked by the retreating Germans, leaving an extensive task of reconstruction for the French and British armies

Above is shown a lot of tires and rims being unloaded at a French port for the use of the Portuguese army in France. A very large supply of such parts and accessories is required by all the allied forces in the field

At the right is a squad of French soldiers loading road repair material onto motor trucks preparatory to carrying it to portions of the road destroyed or injured by the Germans during their retreat

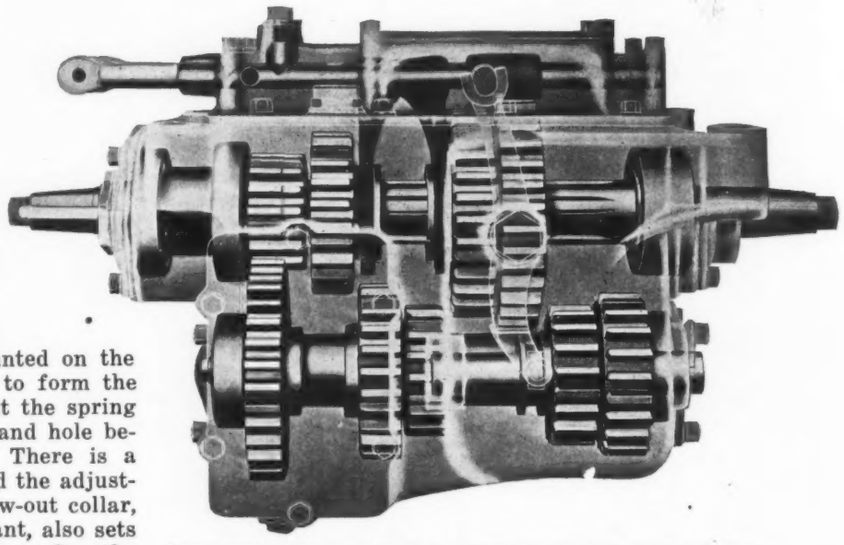
Warner Makes Military Gearset

New Design of Clutch and Transmission Specialty for Class A Army Trucks

A SPECIAL dry disk clutch, a gearset and a gear control unit have been designed and are ready to be produced by the Warner Gear Co., Muncie, Ind., for Class A military trucks. It is announced that the authorities have approved the designs and specifications.

The clutch has the driving members faced with asbestos-wire composition mounted on the outer member and seven saw steel disks to form the driven part. It is inclosed completely, but the spring tension can easily be adjusted from the hand hole because three separate springs are used. There is a clutch brake to facilitate gear shifting, and the adjustment which alters the position of the throw-out collar, so keeping the clutch pedal position constant, also sets the brake so that it comes into action always after the same pedal travel.

In general layout the clutch housing is similar to the bell housing used in unit power-plant construction. Cast iron is used for the cover. Lubrication of the ball bearings is cared for by holes drilled in the clutchshaft. The entire clutch is detached by removing the ring of bolts which attach the cover to the flywheel housing.

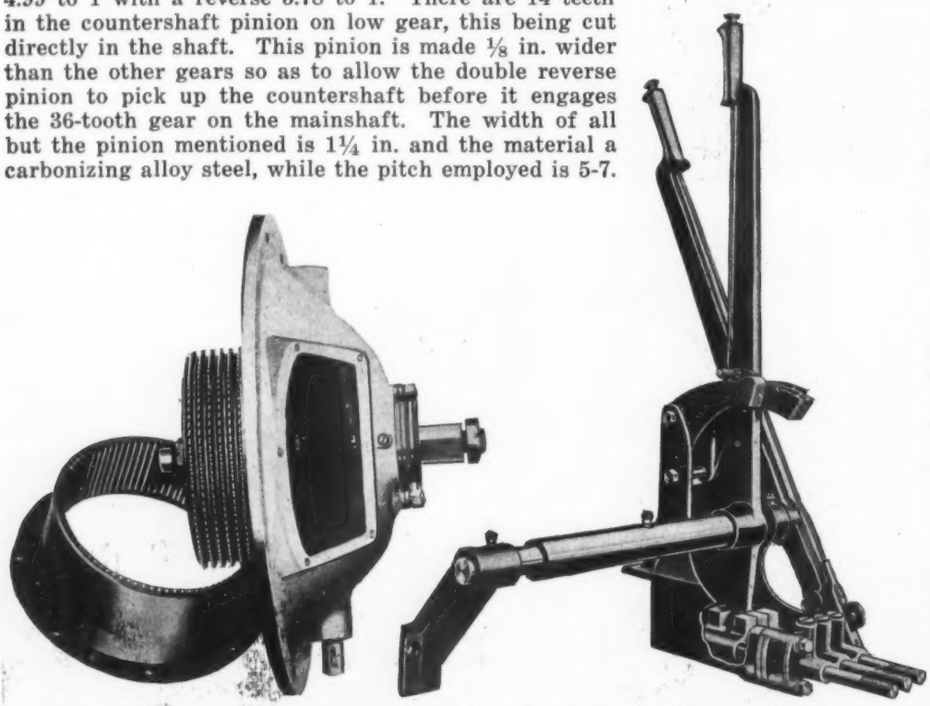


Four-speed Warner gearset for military Class A trucks or 2-ton to 3-ton commercial vehicles

Has Robust Gears

The gearset has four speeds, the lowest ratio being 4.99 to 1 with a reverse 5.78 to 1. There are 14 teeth in the countershaft pinion on low gear, this being cut directly in the shaft. This pinion is made ⅛ in. wider than the other gears so as to allow the double reverse pinion to pick up the countershaft before it engages the 36-tooth gear on the mainshaft. The width of all but the pinion mentioned is 1¼ in. and the material a carbonizing alloy steel, while the pitch employed is 5-7.

For the case the material is cast iron, and the gear shifter mechanism is contained in the cover in accordance with standard Warner practice. Instead of the striking rods coming out at the rear of the box, however, they face the other way, which makes attachment of the lever more suitable with amidship gearbox location. There is a detachable cover plate on the left side of the box which allows a power drive to be fitted if required. This is shown in the illustration.



The Warner clutch and control unit designed for use on military motor trucks Class A. Suitable for 2 ton to 3 ton commercial trucks

The control unit is altogether separate from the gearset, consisting of gear and brake levers and interlocking mechanism. The gate is S. A. E. standard as regards lever positions for different gears, a latch protecting the reverse slot.

Large Bearings

The provision of ample bearings is obviously a feature of the design. The support for the constant mesh pinion, with its two ball bearings and a roller spigot is excellent, and the double-row bearing at the rear end of the mainshaft should take care of any accidental thrusts that might be applied.

To allow escape for air, and so prevent lubricant from being expelled through the bearings, there is a plug in the top of the case consisting of a shell packed with wire screen washers.

For attaching the transmission to the frame there

are two holes for ⅝-in. bolts bored vertically, one on each side of the constant mesh bearings, and two short arms project from the rear corners of the case. The centers for the rear holes, those in the arms, and the front holes, are 11 in. and 6¼ in. respectively. The assumption is that the box will usually be hung from two cross-members, and the faces of the bosses surrounding the bolt holes are all in the same horizontal plane, 3 in. above the center line of the mainshaft. It would, of course, be easy to arrange a yoke at the front end to give a three-point suspension if desired, but the two front bosses being so close together it would probably never be worth while to go to the additional trouble and expense.

Standard Specifications for Motor Truck Transport Bodies for Class A and Class B Motor Trucks

Approved by the Quartermaster-General, May, 1917

General Conditions

1. QUALITY OF MATERIALS: Except it be otherwise specified, all materials are to be the best of their respective kinds, and all labor is to be done in the most thorough and workmanlike manner. In all cases where an article is mentioned in these specifications in connection with the words "best quality," "best make," "proper," or "suitable," the Purchasing Quartermaster or his authorized representative shall decide what is best and most suitable to use.

2. AWARD OF CONTRACT: The bodies herein specified are to be used in the field service of the Quartermaster Corps. In the selection of bodies and award of contract, the quality of material, design, workmanship, and suitability for use by the Quartermaster Corps in field service will be given due weight in determining which proposal shall be accepted.

3. MANUFACTURERS: Each bidder must submit a complete list of manufacturers and location of factories furnishing any part, either finished or unfinished, which is used in the construction of the bodies, and not made in the factory where the bodies are constructed. This shall not be construed as including bar or sheet stock or structural material. If this information is not given the proposal may be rejected, or, in case the proposal is accepted, the Quartermaster Corps reserves the right to name the manufacturer and select the material or parts, and no others will be substituted for those named.

4. EMPLOYMENT OF CONVICT LABOR: In the performance of work herein specified, the contractor shall not, directly or indirectly, employ any person undergoing sentence of imprisonment at hard labor, which may have been imposed by a court of any State, territory, or municipality having jurisdiction, nor permit such employment by any person furnishing labor or material to said contractor in fulfillment of this agreement.

5. PATENTS: The contractor shall for all time secure to the Government the free and undisputed right to use any and all patented articles used in the work, and shall defend at his own expense any and all suits for infringement of any patent or patents, and in case of adverse claims under patents, the contractor shall pay all awards.

Description

6. GENERAL REQUIREMENTS: These specifications contemplate the furnishing, f.o.b. factory, of the number of bodies stated in the "Instructions to Bidders" issued by the Purchasing Quartermaster. The bodies shall be complete in every respect, and ready for installation on the chassis frame. It is intended that these bodies shall be so constructed as to permit of their installation on any chassis frame irrespective of the width or height of frame, and at the same time permit of ready access to the transmission and rear axle, and to give a proper clearance between the rear wheels and truck body when the truck is fully loaded. The body shall be constructed in accordance with details shown on drawing T-105 for Class "A" bodies and drawing T-111 for Class "B" bodies.

7. MATERIAL: The sides, head and tail board and floor are to be made of best quality yellow pine, poplar, cotton-wood or gum. The side stakes, bolsters, sills, top bows and ridge pole are to be made of best quality white oak, ash, elm, or hickory. All wood must be thoroughly seasoned and dressed on four sides.

8. The bows and ridge pole are to be 1 by 2½ in. section, with all edges rounded to a radius of ¼ in. The bows shall be held to the ridge pole and sides of the body by means of best quality malleable iron staples, bolted to the body and bows by means of ¼-in. bolts, with ends of bolts riveted over nuts.

9. All iron or steel used in the construction of bodies must be free from rust, corrosion or pitting, and must not be bent or warped. Where malleable castings are used, they must be thoroughly annealed. The special body parts shown on the drawings, except hinges and hinge butts, may be made of best quality malleable iron on forged steel. The hinges and hinge butts must be mode of forged steel. The ends of all bolts are to be sawed off practically flush with the outside of nuts, and the ends of bolts slightly riveted over nuts to prevent loosening, but not enough to prevent the removal of the nuts with a wrench.

10. SCREWS NOT PERMITTED: All parts of the truck bodies must be connected by means of bolts and nuts. The use of wood screws or nails will not be permitted in any part of the body construction.

11. All steel floor plates, loading plates, body side and end top angles, the 2½ by 2½ by 3/16-in. angle iron at sides of body and all other steel strips or sections shall be in continuous lengths. No piecing of these parts will be permitted.

Covers

12. MATERIAL: The body covers must be best quality No. 6 standard cotton duck, made from American cotton, woven in a workmanlike manner and free from imperfections, thoroughly brushed to remove motes or other foreign substances. The warp to contain not less than 34 and the filling not less than 26 threads of three-ply yarn to the inch, and must be waterproofed. Any standard width of duck may be used, provided the widths are practically uniform in the same cover and will make the finished cover the size specified. No pieced lengths will be allowed.

13. WORKMANSHIP AND FINISH: The widths are to run the short way of the cover, to have 1¼-in. lap and sewed with three rows of stitching. The sides of cover to have a 2½-in. hem folded over double to make three thicknesses of material at that point, sewed with two rows of stitching. Ends to have 2½-in. double fold, neatly made and well secured at corners, sewed with two rows of stitching, first row to be 1¾ in. from edge, second ⅝ in. from first. These folds are for the draw ropes to pass through. All sewing to be done with best quality Sea Island cotton thread, No. 20, six stitches to the inch, color to match color of duck as nearly as practicable.

14. GROMMETS AND ROPES: The covers must have grommets worked by hand over ⅝-in. galvanized iron rings, with four threads of five fold cotton twine, well waxed. The ropes to be ⅜-in. of best quality manila. All side ropes to be neatly spliced into grommets. All face ends to be roll whipped with well waxed thread.

15. LETTERING: All covers must be stenciled U.S.Q.M.C. with 4-in. black Doric letters in center of each side, and center of rear end piece, 14 in. from bottom, with name of manufacturer just below.

16. GENERAL PROVISIONS: The covers must be made in accordance with the dimensions shown on drawings. Bidder to submit sample of duck he proposes to use, showing color and waterproofing. All work to be done in the best work-

(*Continued on page* 1108)

Grandstand and track during the running of the 250-Mile International Sweepstakes on Cincinnati Speedway, May 30

LOUIS CHEVROLET

Winner of the 250-Mile International Sweepstakes in Frontenac

How Chevrolet Won Sweepstakes

Frontenac Covered 250 Miles on Cincinnati Track Without a Stop at the Pits—DePalma Put Out by Track Splinter Puncturing Radiator

CINCINNATI MOTOR SPEEDWAY, June 1—Averaging 102.8 m.p.h., or only slightly less than the American speedway record made by Gil Anderson's Stutz as Sheepshead Bay, Louis Chevrolet in a Frontenac won the 250-Mile International Sweepstakes on the Sharonville track here yesterday. As reported in THE AUTOMOBILE last week, Chevrolet drove a non-stop race, covering the distance in 2 hr. 26 min. 47.90 sec. Ira Vail's Hudson captured second place, crossing the tape slightly over a minute behind the Frontenac and less than a minute ahead of the winner's brother, Gaston Chevrolet, in another Frontenac, who was finally allotted third position after early announcements had credited him with second.

For the first 40 miles, Ralph De Palma's Packard led the field easily, averaging better than 101 m.p.h., and seemingly with plenty of reserve speed, which was attested by the fact that he qualified at a speed better than 109 m.p.h. in the elimination trial. With the race more than half over and his car running like a watch well in the lead, De Palma's inevitable hoodoo overcame him when a large splinter torn up from the track pierced his radiator, and after several attempts to stop the loss of water, he was forced to withdraw.

Chevrolet's victory was the third event of a series of three as staged for the Decoration Day meet. The other two included a Ford Invitation event for 20 miles, which was won by J. H. Stewart of Cincinnati. There were twelve starters in this race, several being fitted with the Roof sixteen-valve engine. It is worthy of note that first and second places

Official Time of 250-Mile Race

CARS	DRIVER	TIME	M.P.H
Frontenac	Chevrolet	2:26:47.90	102.18
Hudson	Vail	2:27:57.44	101.38
Frontenac	Chevrolet	2:28:45.73	100.08
Duesenberg	Milton	2:32:47.55	98.1
Duesenberg	Hearne	2:34:17.36	97.2
Stutz	Cooper	2:34:28.47	97.1
Hudson	Patterson	2:35:48.05	96.2
Ogren	Henning	2:35:49.66	96.2
Hudson	Mulford	2:38:05.05	94.9
Omar	Toft	2:39:28.92	94.1
Oldfield-Delage	Oldfield	2:39:51.65	93.8

were taken by the sixteen-valve Fords. Stewart's time for the 20 miles was 19 min. 0.16 sec., an average of 63.13 m.p.h.

The second event on the card was a free-for-all, non-stock, special invitation event for the *Cincinnati Enquirer* trophy. It was open to all cars regardless of displacement, but no drivers of cars entered in the big event were eligible. This was for a distance of 30 miles and was won by J. Rothart in a Hudson at a speed of 87.9 m.p.h. The speed probably would have been considerably higher had Rothart found it necessary to step on the throttle, but in the field of five starters, there was only one which offered any competition. This was a Paige driven by Joe Nikrent, who returned to the racing wheel after a hiatus of several years. Nikrent's time was 3½ min. slower for the distance than that of the winner, the Paige averaging 81.53 m.p.h. Each of the three races was won by car No. 1.

There was an exceptionally good attendance, numbering in the neighborhood of 40,000 in spite of steady rains several days previously and cloudy skies on the day of the race. The paddock and parking spaces were crowded with cars to a greater extent than usually is found at a race.

The crowd as a whole was demonstrative and enthusiastic and in Cincinnati, at least, there is little evidence of loss of popular interest in speedway races. The crowd rose to its feet for the brushes between De Palma and Louis Chevrolet for first, and Gaston Chevrolet and Vail for second.

Two Minor Accidents

There were two accidents among the twenty-eight starters, but no one was hurt. Mel Stringer's M-E-L turned over and plowed up the field when a rear wheel locked from some cause not yet ascertained. Ostewig's special caught fire on the back stretch and burned up, causing a great flutter among the bleacherites, particularly when after 7 min. after it caught fire, the gasoline tank exploded in a volcano of flame. The driver and his mechanic escaped by jumping. Andy Burt, driving the Erbes special, distinguished himself by slowing up to throw a fire extinguisher to the fire fighters.

Eddie Rickenbacher, who was scheduled to drive the Detroit Special, was forced to give up the wheel to Buzane. Rickenbacher was called to Washington on important government business.

The grandstands were entertained between events by aviation exhibitions, three airplanes operated by Dr. Adams, Kuhl and Ruth Law performing thrilling stunts over the track and in the field.

De Palma Takes Lead

When the twenty-eight starters completed the first lap after their preliminary starting lap, they were running in the following order: First, Joe Thomas in a Mercer special; second, Eddie Hearne, Duesenberg; third, Ralph De Palma, Packard. By the end of this lap, De Palma had jumped to the lead, followed by Oldfield. In the next lap, De Palma was still leading, but Louis Fontaine in the Mercedes had passed De Palma.

Lewis in the Hoskins was the first to stop at the pits, coming in on the 10th mile. In another 4 miles, Fontaine came in for the first of his many tires and from then on did not figure.

At the end of the first 10 miles, De Palma was leading at a speed of 98.36 m.p.h. LeCain was forced to dock his Delage with a broken camshaft housing before the first 10 miles of the race had been covered.

IRA VAIL
Second in Hudson

GASTON CHEVROLET
Third in Frontenac

At the 20th mile De Palma was leading the procession with Louis Chevrolet a close second and Haines in a Mercer special third. At 30 miles, De Palma was averaging 99.91 m.p.h. Chevrolet took the lead at 40 miles with De Palma second, the speed having dropped to 99.96. At 50 miles the order was the same, with Chevrolet doing better than 100 m.p.h.

Oldfield was pushing DePalma very close for second and passed him shortly after. At the 70-mile post, the two Chevrolet brothers were leading the field at 100.79 m.p.h. De Palma again assumed the lead at the 120th mile, with Louis Chevrolet a close second. The time was better than 101 m.p.h.

Chevrolets Lead the Field

De Palma held this lead until 150 miles had been covered, when he retired. This left the two Chevrolet brothers as leaders up to the 230th mile.

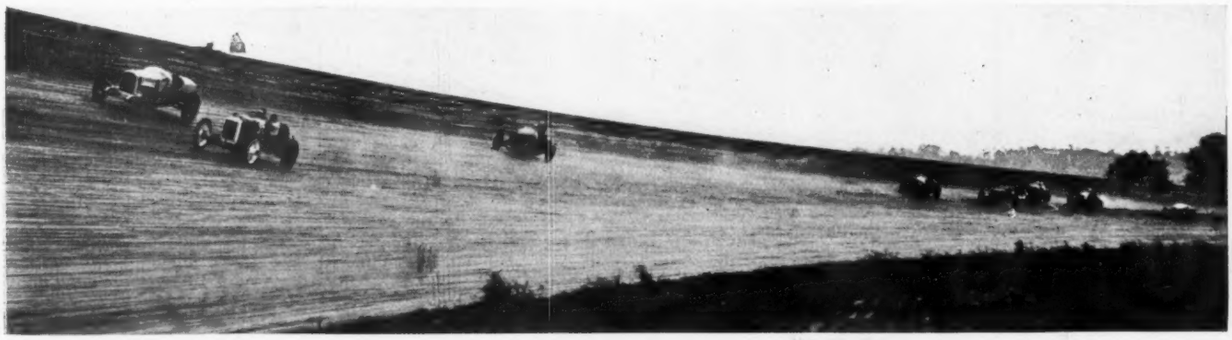
During this time there had been a number of retirements from the race, one of them being the second Delage driven by Devigne, who retired with a cracked cylinder.

At about 220 miles, Gaston Chevrolet took the lead, to be shortly passed by Vail in front of the grandstand. By the end of 230 miles, however, Gaston had taken the lead away from Vail and Louis Chevrolet had also passed the Hudson, so that the two brothers were making a team of it for first and second, though in reverse order. Gaston, however, slowed up to the pits and his brother showed the way for the rest of the distance.

Gaston Chevrolet was almost put out of the race at the 240th mile when a tread wore off the back tire and wrapped around the brake. The car whirled around and banged into the wall on a turn and the exhaust pipe was loosened. Gaston slowed down at the pit, thinking that he would have to change tires, but as the race was nearly over, he was signalled to keep going.

Vail slowed up at the pit at the same time that Gaston Chevrolet came in, but lost little time and passed Gaston for second in the last 10 miles.

Oldfield was up among the first ten most of the time, but



A brush on one of the curves during the International Sweepstakes event on the Cincinnati board speedway

did not finish in the money, checking in eleventh at the checkered flag.

Frontenac's Light Weight

The Frontenac cars are examples of the extensive use of aluminum. The motor is almost wholly aluminum alloy, the particular alloy being Lynite, which weighs approximately one-third as much as cast iron. This includes cylinder block, clutch, housing, engine base, etc. The whole power plant, including engine, fly-wheel, clutch, exhaust and starting crank, weighs only 490 lb., while the entire car tips the beam at a trifle less than 1600 lb., or about 300 lb. less than the weight of any other car in the race.

Both the prize-winning Frontenac cars used Dixon's graphite, as did the two Duesenbergs driven by Milton and Hearne, Cooper's Stutz, Henning's Ogren, Toft's Omar and Oldfield's Oldfield-Delage.

In the non-stock car race, which was closely contested by Hudson and Paige, and finally won by the Hudson, the winner was equipped with the standard Delco ignition, two Hudson carbureters, A. C. spark plugs, Oilzum oil, Goodyear tires, and Rudge-Whitworth wheels. It had a special camshaft designed in such a way as to give an increased lift of 0.024 in. to the valves.

The Paige, which came in second, was equipped with a Dixie magneto, Rajah spark plugs, Goodyear tires, and also had the standard block bored out for larger valves, with a new camshaft.

In the Ford race, the four leading cars were fitted with the Peugeot type head, manufactured by R. M. Roof, Anderson, Ind. The winning Ford had a Splitdorf magneto with Splitdorf plugs, Master carbureter, and 2¾ to 1 rear axle. It also had A. C. brakes.

The Ford which won second place in the race also had a Splitdorf magneto with A. C. brakes and Roof's Peugeot type of head.

Light Weight Won Cincinnati Race

Analysis of Pit Stops Shows Handicap of Heavy Cars—Frontenacs Made No Stops for Tires

THE Decoration Day race at Cincinnati was a triumph of light weight. The aluminum products of the Chevrolet brothers did not have to make a stop for tires, although there were three of them in the race. Two of the three, those which finished first and third, did not have to make a stop for any purpose. The heavy Mercedes driven by Louis Fontaine had to make four tire stops out of the ten which were made. The Hudson which finished second did not stop.

The 100 m.p.h. pace did not seem to trouble the light cars anywhere near to the extent that it did the heavier cars, either in tires or mechanical troubles.

Where mechanical failures occurred they were due to trivial details rather than basic errors in design. Broken oil and gasoline lines were responsible for trouble to one of the Frontenacs, Devigne's Delage, Haines' Mercer, and the Omar special. All of these cars were running well except for these minor defects.

Few Spark Plug Troubles

Spark plug troubles were another source of usual annoyance which was eliminated in this race. The only cars to change plugs were Cooper's Stutz and the Frontenac. In other years a race of this length has meant an endless amount of plug trouble, which indicates that improvements have been made in this direction. In fact, the spark plug men in the race stated that it is in the better location of the plugs that the improvement can be found. In other words, water is being brought closer to the spark plugs. The practice of putting four valves to a cylinder where the displacement of each is above 70 cu. in. has been vindicated in racing practice. It has given the fastest cars a reserve power at these high speeds due to the high volumetric efficiency secured. Chevrolet has four valves to the cylinder with 2 in. inlets and 1¾ in. exhaust, and it is probably to the light weight of the entire car that Chevrolet largely owes his success.

Last year the Frontenac cars were troubled by the lack of proper oiling regulation, but at Cincinnati there was not a sign of sooted plugs on either of them.

Troubles of Unusual Nature

Summing up the entire situation, the cars which went out due to mechanical troubles went out as a result of accidents to parts which ordinarily would not cause trouble. There was only one case of burned out bearings in the entire race, and this was on the Mercer driven by Pete Henderson. On this car the oiling system developed some trouble which starved

Details of Specifications and Equipment of Cars in 250-Mile Cincinnati Race

Car	Driver	Bore	Stroke	Displ	Ignition	Carbureter	Oil	Plugs	Tires	Wheels	Shock Absorbers
Crawford Spec.	H. E. McCord	3.75	6.75	298.2	Bosch	Miller	Mobiloil	Rajah	Goodyear	Rudge	Hartford
Crawford Spec.	C. M. Ewan	3.75	6.75	298.2	Bosch	Miller	Mobiloil	Rajah	Goodyear	Rudge	Hartford
Oldfield-Delage	Barney Oldfield	3.635	7.00	299.0	Bosch Berling	Miller	Oilzum	A C	Firestone	Rudge	Hartford
Frontenac	Louis Chevrolet	3.87	6.37	298.0	Bosch	Miller	Oilzum	K. L. G.	Goodyear	Rudge	Hartford
Frontenac	Louis Chevrolet	3.87	6.37	298.0	Bosch	Miller	Oilzum	Champion	Goodyear	Rudge	Hartford
Stutz Spec.	Earl Cooper	3.828	6.50	295.0	Bosch	Miller	Aristo	Rajah	Goodyear	Rudge	Hartford
Ostewig Spec.	S. Ostewig	4.339	5.00	293.0	Bosch	Miller	Oilzum	Rajah	Silvertown	Houk	Hartford
Delage	Jack LeCain	3.769	6.00	280.0	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Delage	Jules Devigne	3.780	6.00	280.0	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Omar Spec.	Omar Toft	3.750	6.750	298.2	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Duesenberg Spec.	Eddie Hearne	3.750	6.750	298.2	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Packard	Ralph DePalma	2.625	5.000	290.0	Delco	Zenith	Monogram	K. L. G.	Goodyear	Rudge	Hartford
Detroit Spec.	George Buzane	3.824	6.50	283.0	Bosch	Miller	Monogram	Grossman Spec.	Goodyear	Rudge	Mondex
Mercedes	Louis Fontaine	3.70	6.50	278.0	Bosch	Mercedes	Monogram	Grossman Spec.	Goodyear	Rudge	Mondex
Hudson Super-6	Ralph Mulford	3.503	5.00	288.6	Delco	Hudson	Oilzum	A. C.	Goodyear	Rudge	Hartford
Hudson Super-6	Ira Vail	3.522	5.00	290.0	Delco	Hudson	Oilzum	A. C.	Goodyear	Rudge	Hartford
Hudson Super-6	A. H. Patterson	3.502	5.00	288.6	Delco	Hudson	Oilzum	A. C.	Goodyear	Rudge	Hartford
Mercer Spec.	W. S. Haines	3.872	6.375	300.7	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Mercer Spec.	Jos. Thomas	3.872	6.375	300.7	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Mercer Spec.	Pete Henderson	3.872	6.375	300.7	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Newman Spec.	W. E. Taylor	3.813	6.50	295.0	Bosch	Miller	Oilzum	K. L. G	Goodyear	Rudge	Hartford
M. E. L. Spec.	Mel Stringer	3.977	6.00	296.0	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Erbes Spec.	Andy Burt	3.638	7.125	295.0	Bosch	Miller	Oilzum	K. L. G.	Silvertown	Rudge	Erbes
Duesenberg	Tom Milton	3.75	6.75	298.2	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Hoskins Spec.	Dave Lewis	3.75	6.75	298.2	Bosch	Miller	Oilzum	Rajah	Goodyear	Rudge	Hartford
Johnson Spec.	W. Monahan	3.750	6.75	298.2	Bosch	Miller	Mobiloil	Rajah	Silvertown	Rudge	Hartford
Ogren	Otto Henning and Jerry Mason	3.656	7.00	292.0	Bosch	Miller	Oilzum	Rajah	Goodyear	Houk	Hartford

All cars in the race were equipped with Boyce Moto-Meters.

Pit Stops in 250-Mile Race

Car	Driver	Cause of Stop	Duration of Stop
Mercedes	Fontaine	Right rear tire	1 min. 5 sec.
		Tire	30 sec.
		Right front tire	35 sec.
		Rear tire	59 sec.
		Out—broken connecting rod	
Detroit	Buzane	Broken valve washer	5 min. 55 sec.
		Broken radiator cap	4 min. 15 sec.
Special		Clutch trouble	3 min. 37 sec.
		Carbureter trouble	3 min.
		Out—bad clutch	
Packard	De Palma	Out—broken radiator	
Stutz	Cooper	Left rear tire	30 sec.
		Right rear tire	30 sec.
		Tire	30 sec.
		Tire	30 sec.
Mercer	Thomas	Spark plug trouble	5 min. 5 sec.
Mercer	Henderson	Out—crankshaft bearing	
Hudson	Mulford	Water and spark plugs	4 min. 30 sec.
		Rear tire	45 sec.
		Two tires	1 min.
Frontenac	Boyer	Spark plugs	3 min. 5 sec.
		Spark plugs	5 min.
		Out—broken waterjacket	2 min. 20 sec.
Hoskins	Lewis	Carbureter trouble	4 min. 22 sec.
		Tire and gasoline	1 min. 2 sec.
Hudson	Vail	Tire	1 min.
		No card covering second stop was turned in	
Delage	Derigne	Out—cracked cylinder	
Newman Special	Taylor	Left rear tire	50 sec.
		Left rear tire	45 sec.
		Gasoline and tire	1 min.
		Rear axle trouble	1 min.
Hudson	Patterson	Tire	1 min.
		Water, gasoline and oil	1 min.
		Tire and water	1 min. 30 sec.
Mercer	Haines	Out on 40th lap—broken oil line	
Ogren	Henning	Rear tire	45 sec
Delage	LeCain	Out—broken camshaft housing	
Crawford		Carbureter and ignition trouble	12 min. 30 sec.
		Gasoline, water and broken exhaust pipe	2 min. 10 sec.
Oldfield-Delage	Oldfield	Tire and gasoline	1 min.
		Rear tire	40 sec.
		Right front tire	40 sec.
Omar	Toft	Gasoline line changed	3 min.
M. E. L. Special	Stringer	Out on back stretch—wrecked	
Johnson Special	Monahan	Oil	2 min.
		Oil	1 min.
		Oil pump trouble and took on oil	2 min. 30 sec.
		Gasoline, water and oil	1 min. 10 sec.
		Oil	1 min.
		Oil and right front tire	1 min.
		Oil leaking from crankcase—(duration of stop not given)	
Erbes Special	Burt	Water	1 min.
		Right front tire	1 min. 35 sec.
		Out—leaking water line and ignition trouble	
Duesenberg	Hearne	Right rear tire	25 sec.
		Spark plugs	1 min. 35 sec.

the bearings. That this is due to some defect in the piping is possible when it is noted that the Mercer driven by Haines also went out on account of a broken oil line.

There was a noticeable amount of carbureter adjusting in the race, this being charged against the Detroit Special, the Hoskins and the Crawford Special, the latter having a sticking float.

Considering the fact that there were twenty-seven starters, the total of ten tire changes is remarkably low, particularly when it is remembered that four of these were made by one car, the Mercedes driven by Louis Fontaine. The only other car which made more than one tire change was the Stutz driven by Earl Cooper, which made two. The four other cars to change tires were the Hoskins driven by Dave Lewis, the Newman Special driven by Billy Taylor, the Johnson Special driven by Wilbur Monahan, and the Duesenberg driven by Eddie Hearne.

De Palma's Unusual Accident

Probably the worst misfortune of the race was the unusual accident which occurred to Ralph De Palma. His Packard twelve-cylinder engine was running perfectly and he was in the lead, with an excellent chance of winning, when his radiator was punctured by a splinter from the board track. The water leaked out rapidly and he was forced to withdraw after vainly trying to make a temporary repair by means of wood and wire.

The broken steering knuckle which occurred on Stringer's M. E. L. Special narrowly escaped proving fatal, but both driver and mechanic escaped with minor scratches. The accident occurred on the back stretch when the car was going nearly 100 m.p.h.

High Mechanical Development

Summing up the race from the technical standpoint, it can be said that the cars in this race showed the highest mechanical development that has been noted in any of the long speedway races. No fundamental troubles of design of either the car or the engine or in the oil systems can be found. A significant point of this is that the cars exceeded the expectations of the drivers themselves. This is indicated by the fact that a number of them started out with the idea that 100 m.p.h. would win the race. Consequently, the early stages of the race were run at about this pace. As time went on it was found that it would require a higher speed than this to take a leading position, and consequently instead of the average dropping as usual toward the end of the race, it kept going steadily upward as the winners were forced to increase their speed to maintain their leadership.

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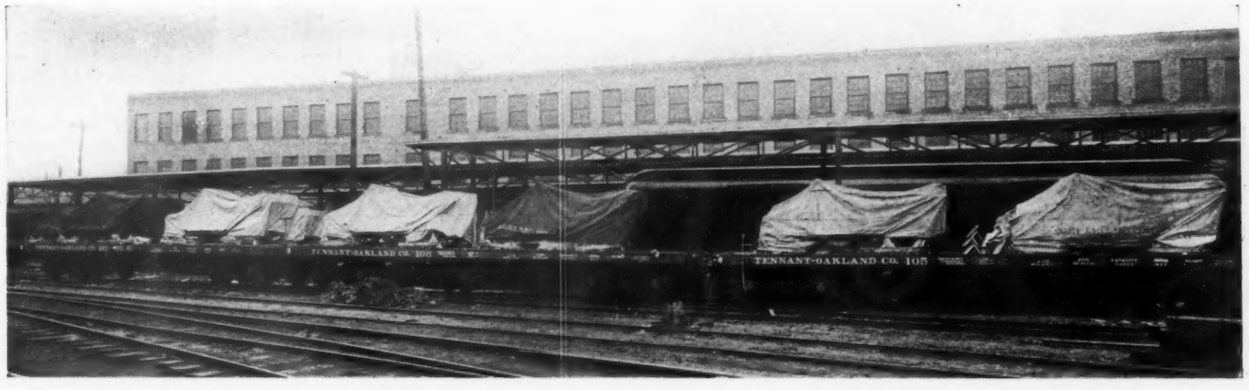
Private Freight Cars Expedite Shipments

THE acute shortage of freight cars has resulted in a rather unusual organization in Chicago, the Tennant Oakland Transportation Co. With its formation a dealer becomes the owner of railroad equipment in company with the meat packer and the fruit grower, who for a long time have owned their own freight cars to make prompt shipments of perishable goods possible.

The photograph shows freight cars loaded at the Oakland factory at Pontiac, Mich., ready for the freight engine.



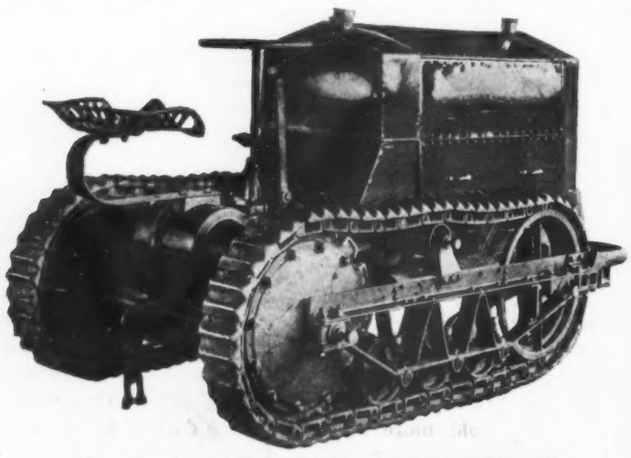
Cleveland Tractor Plows at 4 M. P. H.

Cleveland caterpillar farm tractor sawing wood, one of its many practical adaptations. Note drive is taken from front

DESIGNED by Roland White and being produced in a new plant at Euclid, Ohio, by the Cleveland Motor Plow Co., an extremely interesting tractor has recently made its appearance. It is a track-layer of small dimensions and weight, with an area of contact equal to 600 sq. in. and a total scale weight of 2750 lb. White is a strong believer in high speed plowing, so the machine is designed to work at from 3½ to 4 m.p.h. It is generally characterized by simplicity, though very rugged, and it sells for $985. It will haul two or three bottoms.

The pressure per square inch on the ground at any point does not exceed 5 lb. and a man of average weight exerts a pressure of about 3½ to 4 lb. on his shoe soles and heels. This means that the tractor will run anywhere a man can walk. Over a loose heap of granite chips or gravel it proceeds with a scarcely perceptible sinking in, and the imprint on turf is slight.

Referring to the illustration, the weight of the machine is carried on the three pulleys or rollers seen above the chain on each side. The front wheels carry little or no weight and the rear wheels also have nothing to do except to push the tractor forward along the chain as it lies on the ground. In a track-laying tractor the chain, it must be understood, is not a *driving* chain in the way that a transmission is. The chain is merely a flexible rail, along which the tractor is propelled, and which the tractor automatically picks up and relays in front.



Farm tractor made by the Cleveland Motor Plow Co.

Under the hood is a four-cylinder vertical Buda motor with a cone clutch of truck type. This drives to a two-speed gearset built integrally with a rear axle having bevel drive. Within the axle is incorporated the steering gear which is operated by engine power. To follow the action imagine the transmission and differential with bevel drive exactly as in a truck, but instead of solid drive shafts from the differential to the rear wheels there is a planetary gear on either side. The differential driveshafts are connected to the rear wheels through the planetary trains, this giving a gear reduction in addition to that provided in the transmission and by the bevel.

The drive from the differential to either rear wheel is thus the equivalent of a planetary automobile transmission on low gear. To steer it is necessary to make one side of the machine advance more rapidly than the other and this is accomplished very simply by applying a brake to either of the planetary gears just as though the high gear was being gently engaged. A slight application will cause a turn to be made in a wide sweep, while full engagement gives one wheel twice the speed of the other and produces a very short turn. The effort required on the steering wheel is very slight.

The suspension is interesting, the front end being sprung and the rear solid. Each set of wheels and the chain track is carried in a frame free to pivot on the center line of the rear axle. Across the front these two frames are connected together by a spring. A separate frame running forward from the rear axle carries the engine, radiator and, in fact, every other part. This layout allows the two chains great flexibility, since one can be running uphill while the other is running down, the only effect being to flex the front spring; no twist can possibly be transmitted to the engine frame.

The cast iron treads for the chains are made in short sections, and are each attached to the chain proper by bolts slipped in and secured with cotter pins. It is very easy to replace any portion of a tread. Owing to the very small unit pressure on the ground the durability of the chains should be very great indeed; also the pivot pins are only transmitting driving force while the links they connect are lying on the ground. The rear wheel pulls on the portion of the track ahead of it, but the weight of the chain is the only tension on the parts around the wheels or on the top. It is claimed that the machine can be run on ground both wetter and dryer than most other tractors, it is even stated that successful operation over snow is possible. The rating is 12 hp. at the drawbar figured on a 4 m.p.h. speed, and 20 hp. at the belt.

MANUFACTURERS' MERCHANDISING

Room for Several Million More Cars

Big Potential Farm Market

Standard Parts Co. House Organ Finds Point of Saturation Still Far in Future —Road Improvement Important Factor

THE domestic market for passenger cars is still short of its requirements by several million machines. Such is the well-reasoned argument of the Standard Parts Co., Cleveland, Ohio, published in the *Standard Parts Messenger*, the company's house organ, for April, 1917:

Wanted—More Automobiles

There were 6,361,502 farms in the United States in 1910. The number is greater to-day.

There will be 1,690,291 automobiles manufactured in the United States this year. Add to this all the automobiles produced in this country in the 5 years of 1912-1916, both inclusive, and the grand total is 5,296,719.

This figure, it will be observed—(the total production of six big plants)—is more than a million short of enough to supply one automobile per farm in the United States alone.

This is, in part, the answer to the question—Have we reached the point of saturation in automobile manufacture and distribution in this country?

Greatest Things to Be Developed

Suppose we omit all the nearly 2,000,000 names of business firms, companies, and concerns listed in Bradstreet's. Then omit all capitalists and retired people of wealth; omit the million or two of doctors, lawyers, architects and other professional people. Omit another two or three million of insurance men, real estate men, salesmen, etc., and semi-professional people, also some millions of well-paid mechanics, etc. In short, omit all possible buyers of automobiles in this country except the farmers and farm people. Omit the export of automobiles entirely—and there still remains a market whose purchasing and consuming power is enormous, and which for many reasons is every day becoming greater.

In 1910 the average value of farm property per farm was $6,444. This represented an increase of 60.9 per cent over the values shown in the average census of 1900.

The increase has been more rapid in the past seven years than in the 1900-1910 period; but taking even $10,000 as the value of property per farm as being conservatively an average to-day, ask any automobile salesman whether he would consider a man worth $10,000 and one whose manner of life and business should make a machine particularly useful to him—ask that automobile salesman whether he would consider such a man a good prospect.

Farmers are making more money now than in the ten-year period from 1900 to 1910. No one can doubt that; but even in the ten years back of 1910 they did pretty well, it appears. The average value of farm buildings increased in that decade 77.8 per cent. The average value of implements and machinery owned increased 68.7 per cent, and the average value of live stock per farm increased 60.1 per cent. All these increases were from 1900 to 1910. They had nothing to do with war-time prices.

Then and now a chief reason for the steady growth in farm wealth lies in the more scientific methods which are being adopted. Thousands of bright young men are studying in agricultural colleges. They are rapidly spreading in their home and other communities a knowledge of the more productive ways, the more efficient and economical methods. All these things contribute to make the farm a certain user of automobiles.

No one can obtain from a motor vehicle a greater usefulness than can the farmer. Transportation he must have, both for himself and his products. Every dollar which saves time and adds to his efficiency is an investment which will pay dividends. While many owners of cars in the cities must figure their machines as largely an expense, farmers make of them an investment.

$1,000,000 a Day

But there is another factor which daily contributes more and more to the certainty of the steady increase in the farm market for motor cars of all types. The known expenditure for permanent road improvements is running close to $300,000,000 a year. The unknown expenditure—work privately done, etc., is conservatively estimated at not less than another $100,000,000 annually, or, all told, more than $1,000,000 daily. Every mile

—every rod—of improved roads adds to the radius of the year-around usefulness of every automobile and adds immediately to the number of certain new buyers of machines.

It is a subject upon which volumes might be written. Not a tenth part of the story is here, nor even broadly suggested. The country's whole rural population in 1910 was 49,348,883 as against 42,623,383 classed as urban population. The distribution of wealth is far more equitable in the country than in the city. There is more thrift in the country.

A very large percentage of American farms are shown to be wholly without encumbrance, but of those which are not debt-free the ratio of indebtedness to value is only 27.3 per cent or $1,715 on the average against the average value (in 1910) of $6,444. In 1900 the ratio of debt to value was 35.5 per cent. Undoubtedly the decrease has been enormous in the last 5 or 6 years. The 1920 census will completely overshadow all former records of our agricultural wealth.

No one can doubt this, and one meaning of it all is that the field of greatest purchasing power, usefulness and benefit, dollar for dollar investment in automobiles, is just now being opened up.

Car Sales Gain in Oregon

No Slump in Registration of New Automobiles— April Statistics Show Slight Increase Over March

BUSINESS held good in Oregon during April in spite of the war. Although there was no spring rush for automobiles, yet the figures of new cars registered exceeded those of March by fifty-one. The greatest number of any one make listed was 455 Fords. This, however, was a drop of 72 from the 527 registered in March. Most of the makes showed a slight gain over the month before. Buick gained thirty-one, Chevrolet twenty-two, and Maxwell twenty-one in new cars registered.

Multnomah County leads all the others in number of automobiles as it does in population. It was this section, however, which showed a big decrease in April from March, going from 359 in the earlier month to 319 last month. In general the counties with the larger populations were the ones to show a falling off, whereas the slack was taken up by the less populated communities. This would seem to indicate that the slight business depression was being offset by agricultural prosperity.

The new car registrations declined, as might be expected, during the winter months. They were highest in December and showed a steady decrease, reaching the low figure of 799 for the State in February. March showed a quick recovery in the registration of 1140 new motor vehicles; but April fell short of the December figure, which was 1208.

It is interesting to note that the sales curve in Multnomah County, where Portland is located, does not follow the State rise and fall. January was the month of least registration in this county with a recovery in February.

Careful compilation of the automobile registration in Oregon has been made by M. O. Wilkins, president and manager of the Dealers' Motor Car Assn. of Oregon, and publisher of *The Automobile Record*, Portland, Ore.

The two accompanying tables from the Wilkins statistical statement show the registration of cars by makes, and the number of cars in the respective counties for December, 1916; January, February, March and April, 1917.

All Counties of Oregon—By Makes. November to May 1, 1917

	DECEMBER		JANUARY		FEBRUARY		MARCH		TOTAL		APRIL		TOTAL	
	N	T	N	T	N	T	N	T	N	T	N	T	N	T
Briscoe	10	32	5	11	1	4	2	3	18	50	4	9	23	59
Buick	91	1090	83	660	47	211	51	160	272	2121	82	199	354	2320
Cadillac	16	526	6	190	.....	56	4	58	26	830	13	54	39	884
Case	2	52	1	36	.....	10	1	10	4	108	.....	13	4	121
Chalmers	15	307	4	193	7	51	10	48	36	599	12	42	48	641
Chandler	6	37	3	19	2	5	3	4	14	65	9	14	23	79
Chevrolet	29	233	36	208	38	85	53	87	156	613	77	128	233	741
Cole	3	74	4	27	3	10	5	18	15	129	.....	3	15	132
Dodge	57	752	57	348	48	108	96	152	258	1360	98	151	356	1511
Dort	3	7	4	10	4	4	13	15	24	36	14	15	38	51
Ford	527	5863	460	4175	403	1316	527	1105	1917	12459	455	951	2372	13410
Franklin	16	188	2	72	8	24	10	27	36	311	7	22	43	332
Grant	2	39	4	44	4	16	5	10	15	109	5	10	20	119
Haynes	1	60	1	16	1	12	3	5	6	93	1	4	7	97
Hudson	25	258	17	140	13	50	14	37	69	485	22	46	91	531
Hupmobile	11	158	10	100	7	30	14	27	42	315	11	19	53	334
Kissel	3	28	2	3	4	6	5	5	14	42	1	2	15	44
Locomobile	1	30	1	10	.....	6	0	2	2	48	0	0	2	48
Maxwell	49	479	54	400	36	144	63	128	202	1151	84	154	286	1305
Marmon	3	32	3	7	2	5	0	2	8	46	0	0	8	46
Metz	3	31	1	39	3	21	5	18	49	321	1	16	13	125
Mitchell	16	153	13	109	9	28	5	18	12	109	23	39	72	360
National	1	23	1	7	.....	2	2	4	4	36	1	2	5	38
Oakland	11	192	15	115	11	42	10	27	47	376	28	63	75	439
Oldsmobile	9	88	4	32	7	16	5	15	25	151	3	10	28	161
Overland	57	941	49	676	39	229	65	207	210	2053	72	214	282	2267
Packard	9	109	.....	25	.....	5	2	6	11	145	2	7	13	152
Paige	7	56	1	27	1	7	7	11	16	101	4	8	20	109
Pathfinder	1	6	.....	5	.....	.....	0	0	1	11	.....	2	1	13
Pierce-Arrow	3	78	2	17	.....	7	1	5	6	107	.....	1	6	108
Reo	24	343	11	216	8	85	7	54	50	698	15	68	65	766
Saxon	14	145	14	121	11	40	22	45	61	35	19	43	80	394
Scripps-Booth	3	12	2	3	1	1	2	2	8	18	2	3	10	21
Studebaker	68	1065	48	754	24	233	49	214	189	2266	38	195	228	2461
Velie	7	54	6	23	10	18	11	19	34	114	7	14	41	128
White	3	77	.....	31	.....	14	0	8	3	130	1	10	4	140
Winton	6	52	1	30	2	8	3	6	12	96	1	13	13	109
Miscellaneous	7	572	7	464	3	147	3	136	20	1319	7	132	27	1451
Ford Trucks	39	600	14	294	23	59	24	52	100	1005	28	58	128	1063
Trucks	50	965	23	388	19	107	32	100	124	1560	44	106	168	1666
Totals	1208	15807	969	10045	799	3222	1140	2863	4116	31937	1191	2840	5307	34777

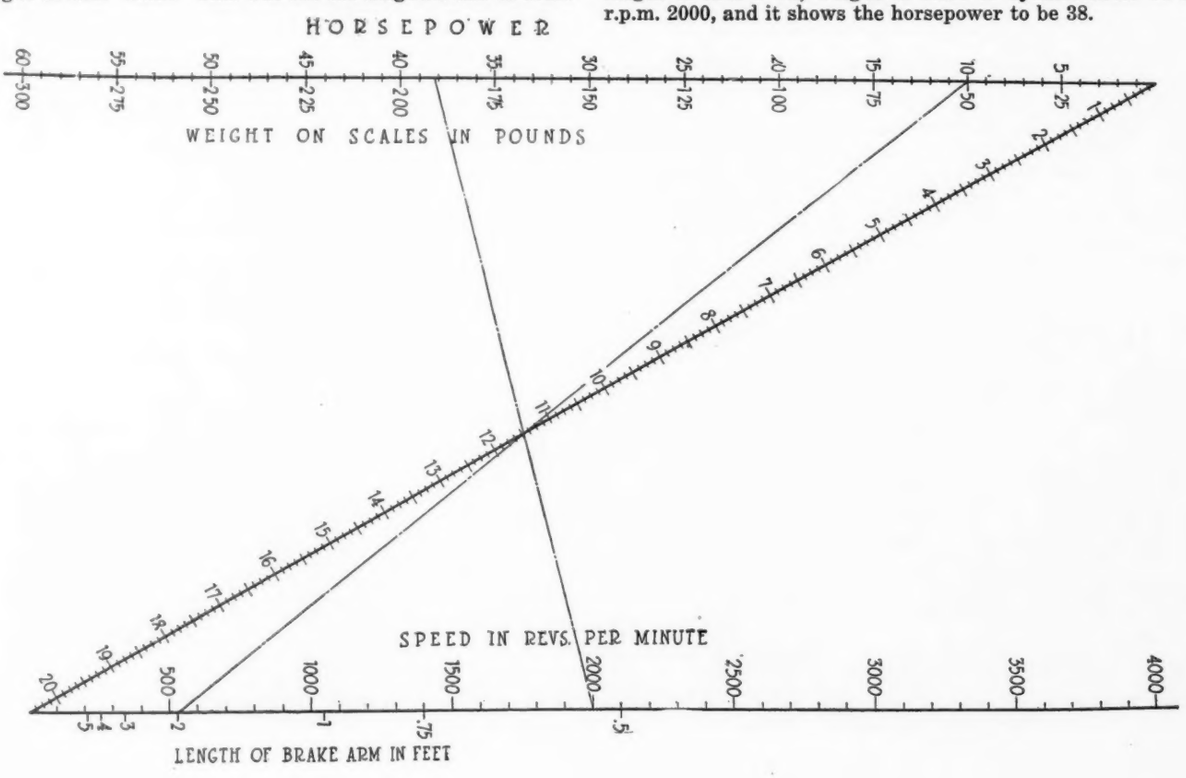
All Makes—By Counties of Oregon. November to May 1, 1917

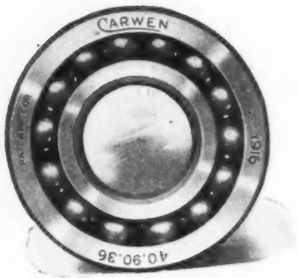
	DECEMBER		JANUARY		FEBRUARY		MARCH		TOTAL		APRIL		TOTAL	
	N	T	N	T	N	T	N	T	N	T	N	T	N	T
Baker	15	110	24	204	10	75	19	84	68	473	38	185	106	658
Benton	18	234	16	238	14	73	18	48	66	593	15	41	81	634
Clackamas	44	630	39	369	25	119	40	98	148	1216	39	63	187	1279
Clatsop	19	387	22	186	15	33	13	32	69	638	25	37	94	675
Columbia	3	111	8	73	2	16	10	23	23	223	18	28	41	251
Coos	10	146	15	138	7	60	5	50	37	394	11	48	48	442
Crook	16	141	26	131	12	42	5	23	59	337	5	22	64	359
Curry	.....	4	1	11	2	15	0	9	3	39	3	9	6	48
Deschutes	2	45	13	176	7	60	3	20	25	301	31	60	56	361
Douglas	27	272	25	251	10	101	23	71	85	695	17	88	102	783
Gilliam	19	79	34	142	12	37	11	21	76	279	12	21	88	300
Grant	1	42	12	53	5	25	2	13	20	133	2	24	22	157
Harney	11	72	12	73	4	35	5	32	32	212	7	45	39	257
Hood River	6	103	3	116	4	54	13	60	26	333	19	40	45	373
Jackson	36	523	41	574	22	220	35	97	134	1414	57	109	191	1523
Jefferson	20	75	22	82	11	22	6	9	59	188	16	22	75	210
Josephine	14	126	17	181	8	68	16	49	55	424	15	37	70	461
Klamath	16	179	9	163	12	62	21	68	58	472	30	126	88	598
Lake	4	50	3	41	6	57	10	39	23	187	12	61	35	248
Lane	54	692	34	481	43	143	64	128	195	1444	63	108	258	1552
Lincoln	1	18	.....	8	.....	6	0	3	1	35	1	5	2	40
Linn	26	318	26	481	40	169	64	141	156	1109	49	97	205	1206
Malheur	14	101	18	136	13	67	19	68	64	372	16	62	80	434
Marion	77	1034	59	871	48	188	74	163	258	2256	60	138	318	2394
Morrow	36	145	28	141	11	41	10	25	85	352	26	37	111	389
Multnomah	435	7697	244	2174	295	658	359	689	1333	11218	319	570	1652	11788
Polk	13	227	14	303	21	94	39	92	87	716	43	88	130	804
Sherman	28	141	26	172	11	52	15	35	80	400	29	48	109	448
Tillamook	14	131	15	157	8	41	8	28	45	357	10	21	55	378
Umatilla	117	748	69	640	40	162	69	183	295	1733	55	124	350	1857
Union	38	221	18	193	16	103	12	89	84	606	35	183	119	789
Wallowa	3	55	6	71	10	43	10	36	29	205	11	59	40	264
Wasco	22	246	15	265	15	70	39	89	91	670	35	68	126	738
Washington	20	339	17	290	12	110	54	130	103	869	36	77	139	946
Wheeler	2	19	4	26	.....	8	0	8	6	61	2	8	8	69
Yamhill	27	346	34	434	28	93	49	110	138	983	29	81	167	1064
Total	1208	15807	969	10045	799	3222	1140	2863	4116	31937	1191	2840	5307	34777

Ready Reckoner Chart for Dynamometer

Contributed by H. M. Brayton

MARK off point registering length of dynamometer arm in feet. This will be permanent for any one instrument. To translate reading in pounds to horsepower, mark off the weight on the top line and draw a line to the point on the "length of arm" scale. This will cut the diagonal line at some point. Through this point of intersection draw a straight line which also cuts the speed of revolution scale at the proper point and this same line will show the horsepower at its opposite end. The example shown by dash lines had for data: length of arm 2 ft.; weight in scale of dynamometer 50 lb.; r.p.m. 2000, and it shows the horsepower to be 38.





Full type Carwen double-row ball bearing

New Bearing Ingeniously Assembled

Outer Race in Double-Row Carwen Type Is a Single Piece—Carlson-Wenstrom Co. Will Also Make Akimoff Balancing Machine Under Carwen Name

A NEW design of ball bearing, distinguished by an ingenious method of assembling which permits of making the outer race in a single piece, has been placed on the market by the Carlson-Wenstrom Co., Philadelphia, under the trade name of Carwen, which is made up of the first syllables of the names in the firm name. The method of assembling obviates the necessity of filling grooves which are generally regarded as a weak point in ball bearings. As the illustrations show, the bearing is made either with a separating cage for high speeds or entirely filled with balls for low speeds.

The construction by which this is accomplished is shown in the sectional view. The inner race is split in a plane at right angles to the shaft axis, and the two halves are accurately matched and finished together, so that they form in effect a solid piece when assembled. To assemble, the inner races are rocked, causing one to slip on the other, thus presenting an opening through which all the balls may be inserted.

This construction permits the ball path of the inner race to be ground to a curvature very slightly larger than the radius of the balls, so that under pressure the path of contact assumes an appreciable width. This path is unbroken at any point by openings to insert the balls, hence even if worn loose no hammering can occur.

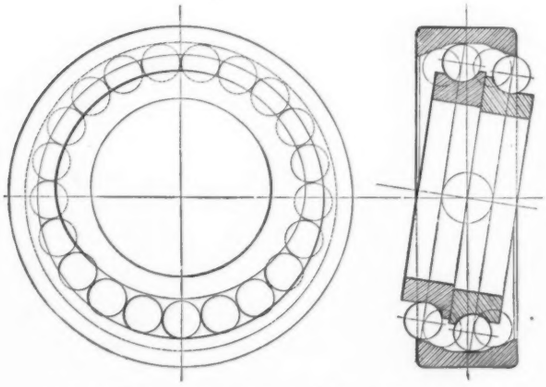
Bearing Takes Large End Thrust

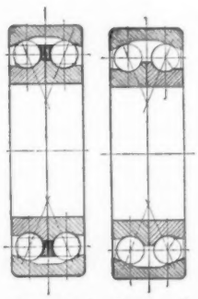
In the Carwen bearing the line of contact makes an angle of 18 deg. with the plane perpendicular to the shaft axis. Hence the bearing will take a large amount of end thrust, while at the same time its radial load capacity is almost as great as that of a single row bearing. Owing to the method of assembling, the inner race must be locked on the shaft; but this is general practice with other bearings also. To take the bearing apart it is only necessary to wrench the inner races around in the outer race, which can be done by means of a steel rod or pipe of a diameter materially smaller than the bore of the inner race. The races of the new bearing are made of quality steel and hardened all through. Being of the two row type the bearing is classed in the 5000 series and the full range of sizes will be made, which will be interchangeable with other standard ball bearings. Prices will range 50 per cent above those of high grade single row bearings of the same size.

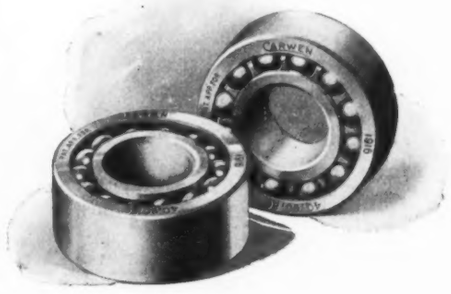
The Carlson-Wenstrom Co., manufacturer of the Carwen bearings, has been in existence for about 5 years and been engaged in the manufacture of standard gages and other high-class machine products. John Carlson is president, Mr. Quimby, vice-president and Mr. Wenstrom, secretary-treasurer. Charles S. Butler, who for many years was connected with the Hess-Bright Mfg. Co., has joined the company as sales manager.

The concern owns a modern factory, where about 150 men are employed. Development of the bearing was started one year ago and production is now under way, about 300 bearings being turned out per day.

In addition to ball bearings the Carlson-Wenstrom Co. manufactures a dynamic balancing machine for balancing crankshafts and other revolving parts. This machine was formerly known as the Akimoff, but an improved design has been completed and will be marketed under the company's trade name as the Carwen dynamic balancing machine.


Side view and cross-section of full type, showing method of assembling


Sectional views of separator and full types



American Ambulance Units for France

THE American Motor Ambulance Field Service in France is sending on an average of 250 volunteers from the United States for this service to France each week, the volunteers being divided into units of twenty-five each. This field service is headed by A. Piatt Andrew, former assistant to the secretary of the Treasury, who has his headquarters in Paris. Nearly all these volunteers are drawn from the colleges of this country, and each one must be able to drive and repair an automobile.

While expert knowledge is not required some practical experience is essential, and those who volunteer here are given several week's practical experience in building Ford cars in some school, garage or factory, before sailing. This particular service uses Ford cars exclusively in the field.

About 800 such volunteers are now in France and it is believed that the number which is sailing week after week will soon increase the total to several thousands. The age limit is from 21 to 35, and the minimum enlistment is for 6 months. Each volunteer must pay his own expenses and deposit approximately $400 before being accepted. This sum is to cover his expenses going to and from France, and while in that country.

Roller Bearings for Engines

Plain Bearings for Engines Relic of Dark Ages—Mechanical Efficiency and Durability Enormously Increased by Use of Rollers—Stiffer Crankshaft and Greater Compactness Follow Adoption of Anti-Friction Journals

By Granville E. Bradshaw

¶EDITOR'S NOTE.—The writer has had as wide experience as any man living in the building of aviation engines, having been one of the first engineers in Europe to devote himself to this branch of industry. In 1912 he built a small two cylinder opposed type which ran successfully at 6000 r.p.m., and he has been responsible for a great variety of airplane motors.

COMMENT.—The following article, reprinted from *The Autocar* (England), contains much food for thought. That Mr. Bradshaw is right in one contention is undoubted, this being that in using plain bearings for engines designers have followed the line of least resistance. A fact which he does not mention, and which is of some importance, is that the Commercar, one of Europe's best trucks, has had a ball-bearing engine for many years, adopting this type simply because it was found to give less trouble in service. A majority of racing engines now have ball-bearing crankshafts, but rarely are ball bearings used for the lower ends of the connecting rods. There is no reason against their use at this point except the difficulty of assembly. The old idea that the explosive shock bore most heavily upon the big end bushings is fairly well abandoned; we know now that the explosive pressure is not the worst the bearings have to support in a high-speed engine.

IN every phase of engineering to-day the friction type of bearing is being ousted by bearings of the ball and roller type. Wherever a part is difficult to lubricate, or shows signs of rapid wear, the engineer immediately turns to the ball bearing to cure his troubles. Hence we now see this type of bearing almost universal for rear axles, front axles, gear boxes and all the mechanical essentials of a motor car except the one that should have first consideration—the engine.

The designer knows instinctively that once he has fitted a ball bearing he can forget that it is there. He knows that if it is housed and applied properly it will carry on indefinitely without any nursing or tending, and he knows all this from experience of the general satisfaction it has given in the past. He cannot fit oil sumps and lubricating systems to his axles, gear boxes, etc., so he fits ball bearings. He is compelled to do so because the ball bearing is the only kind that will meet the requirements.

But why is the engine left out? Why has our highly efficient, high-class, high-speed power unit to put up with the old friction type of bearing used by our forefathers on heavy, slow-speed gas and oil engines, when modern science has produced the ball bearing? The reason is not far to seek. The ball bearing offers certain difficulties to the designer, and he has found it easier to provide a nurse, in the shape of a lubricating system, to keep his friction bearings alive than to fit the bearing that requires no such nurse.

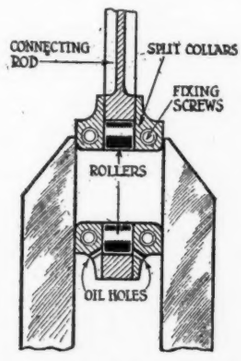
There is some subtle attraction in the "path of least resistance," but in engineering it does not always pay, because one is apt to blind oneself to the great and hidden possibilities of the other path.

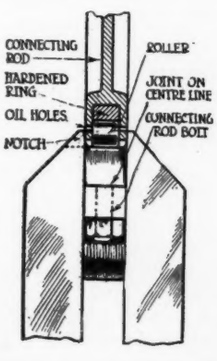
In the case of the gearbox and axle the path of least resistance was found to be the fitting of ball bearings, and in a great many other details if the load has been found to be too great for the existing friction bearing the ball bearing has been applied. One cannot help feeling that, in justice to the engine—the very heart of the car—similar improvements might have been incorporated in its bearings also.

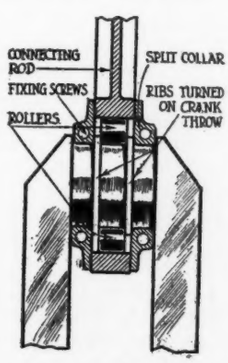
Rollers Better Than Balls

Lately the roller bearing has appeared as an improvement on the ball bearing for many heavier duty purposes, and the writer's experience with this, in connection with connecting rod big ends, during the past three or four years has been a very happy one.

Formerly, in roller bearings, rollers were used of a considerable length in proportion to their diameter. These bearings proved to be unsatisfactory on account of the impossibility of machining the rollers dead true. It was a question of the craftsman fighting against inherent defects in design. Supposing the roller is slightly tapered it must be evident that in one revolution the large end of the roller will have travelled further than the small end. The roller is thus twisted out of parallel to the shaft, causing vibration and end thrust. No mat-







Left to Right—Fig. 1—Hoffmann type roller bearing. Fig. 2—A design where the rollers bear directly on the crankpin and in the lower end and are secured by split clamp rings. Fig. 3—Construction with outer race held in split lower end of rod. Fig. 4—An elaboration of the design of Fig. 2

ter how nearly accurate the roller is made it is useless if not dead true, because the tiniest amount of twist is multiplied and increased as the roller continues to roll. The craftsman, therefore, is inevitably beaten in the long run.

A more recent and completely successful bearing is the modern short roller Hoffmann, as shown in Fig. 1. In this type the steadying effect of the sides of the grooves plays a very important part in the successful operation of the bearing, and the load-carrying capacity of this type is very high. It is a type of bearing, however, that cannot readily be applied to a connecting rod big end without building the crankshaft up in sections or using excessively large bearings. The former course is quite out of the question for obvious reasons. A method evolved by the writer—viz., that of using a hardened crankshaft and connecting rod big end with the rollers inserted and running in direct contact with the parts—has successfully overcome the usual difficulties associated with manufacture. In this method the connecting rod is threaded over the crank webs, and need not be of an excessive size in order to accomplish this, the rod being very narrow at this part, and the size, of course, arranged so that the gap between the bore of the connecting rod and the diameter of the crank pin is exactly filled up by the rollers.

Guiding the Rollers

The writer has, from time to time, adopted numerous methods of keeping the rollers in place, and so far the simplest plan appears to be to use a split collar, case-hardened and ground, the halves being held together by screws. No detrimental effects have been observed to result from the joint and none is likely to occur, as the joint is comparatively easy to make accurately and without a step. A big end of this type is shown in Fig. 2. It has the advantage of enabling the big end to be made in one piece without cap bolts. There is, therefore, no initial stress in this part. A separate hardened ring can be used to form the outer race as in Fig. 3, and the connecting rod split to clip over it. This results in a very narrow bearing and consequently a stiff crank. In this case a notch has to be cut in the top of one web in order to insert the rollers, and the crank webs must, of course, be given a little clearance so as not to foul the connecting-rod shank. One-sixteenth of an inch taper on the sides of the webs is quite sufficient for this.

Another method is to locate the rollers sideways by ribs turned on the crank as shown in Fig. 4, but this is more expensive. It has, however, the advantage of avoiding the split in the collar coming into contact with the rollers. Numerous modifications in these designs can be made, and they can, of course, be applied to the main bearings as well as to the connecting rod big ends. It is unnecessary to drill the crank for oil feed to the bearings, but suitable clearances must naturally be left for easy working fits; to obtain these requires a great amount of experiment. The writer has used as many as seven connecting rods on one crank throw in aero engine work, and these have been placed side by side with thin washers between and the whole held together by a single split collar.

In aero engine work the ball and roller types of bearing are being more generally adopted every day, and as in their usual forms they are somewhat heavier than the friction type of bearing it may safely be assumed that it is the unreliability of the friction bearing that has caused the more modern types to be adopted.

While the white metal friction bearing has proved reasonably successful on modern motor-car engines with the aid of a careful arrangement for continuous oil feed, the more strenuous life of the aero engine has discovered numerous weaknesses inherent in this type of bearing, and there can be no doubt that it will be discarded as engine speed and efficiency increase.

The capacity of a friction type of bearing to withstand a continuous heavy load depends principally upon the viscosity of the oil. Theoretically the kind of metals used for shaft and bearing should be immaterial because of the principle of lubrication being to interpose a layer of oil between the two surfaces to prevent metallic contact. This may be sufficiently correct for low loads and heavy lubricants, but unfortunately in high-speed work metallic contact frequently occurs, so that the materials have to be very carefully chosen.

When a bearing fails it is generally due to the load being sufficiently heavy to squeeze out the oil from between the surfaces so that seizure occurs. By artificial cooling bearings have been made to run successfully under a load of nearly two tons per square inch of projected area, and this has been sustained for weeks continuously. It will, therefore, be seen that the friction type of bearing is very susceptible to temperature. Consequently the viscosity of the lubricating oil is easily reduced. This is exactly where the gas engine is at a disadvantage, because normally it is a heat-producing engine.

A type of bearing adversely affected by the normal working of the engine and by increase of load is not an ideal mechanical arrangement. For this reason racing cars and many aero engines are fitted with a system for cooling the oil.

Several highly successful racing car engines have been fitted with ball bearings to the crankshaft with apparently excellent results, but there does not appear to be any case of a manufacturer having tackled the subject thoroughly with a view to the total elimination of the friction bearing, and, incidentally, the network of oil pipes, etc., necessitated thereby. The motor bicycle engine is ahead of the car engine in this respect; the plain friction bearing has been largely discarded, principally because of the restricted space rendering large bearings impossible, and the necessity for cheapness preventing the additional expenditure involved in an automatic lubricating system.

Oil Viscosity Not Important

In ball and roller bearings the temperature (within ordinary working limits) and the viscosity of the oil do not affect the problem. It is also not generally known that the friction in a roller bearing is less when the bearing is dry than when lubricated. Lubrication appears to be principally necessary to prevent rust, and the stoppage of the lubricating system, even for an hour or two, has no detrimental effect.

In his experiments with roller bearings the writer has confined himself to the hardening of the shaft, the threading of the connecting rod and other bearings over the crank throws, and the running of the rollers direct on to the hardened surfaces. He ought also to mention that Hoffmann rollers have been almost invariably used and have given the greatest satisfaction.

Although the case hardening of a crankshaft is a somewhat difficult operation, the difficulties presented are not insurmountable, and it is principally a matter of experience gained by experiment. Crankshafts with six throws and eight main bearings were hardened satisfactorily and in several hundreds of engines of smaller sizes there was not a single fractured crankshaft from brittleness.

The Vickers method of local treatment of a carbonized surface would appear to be particularly useful in this connection, allowing, as it does, the hardening of the

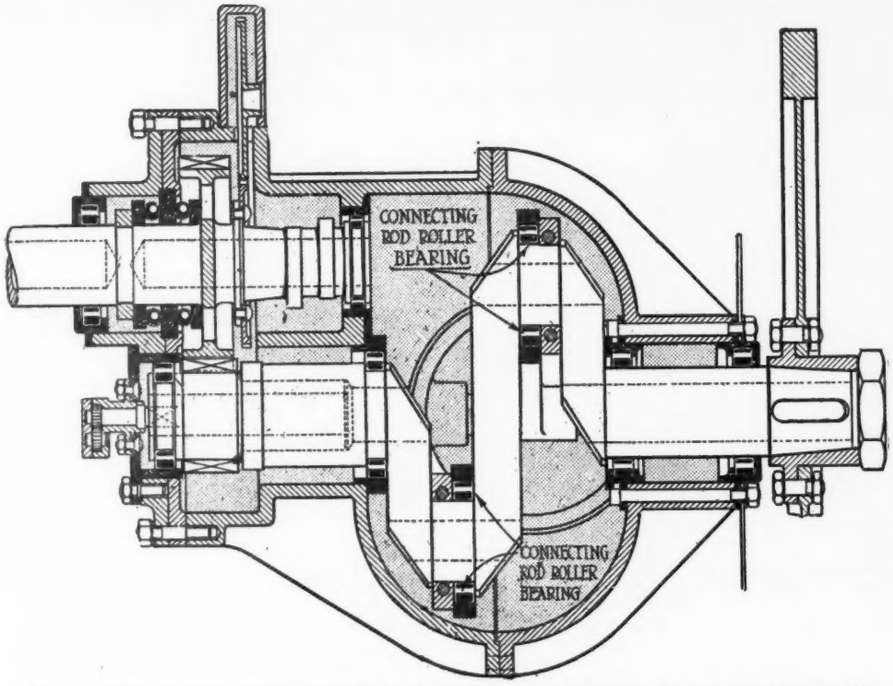


Fig. 5—Roller bearing engine designed by G. E. Bradshaw and built for war purposes by the A. B. C. Motors Co. The rollers bear directly upon the crank and within the lower ends of the connecting rods

crank pins and main bearings without the necessity of hardening the crank webs. In this way the crankshaft may be easily straightened if warping should occur, as the necessary twist or bend can be made in the soft places.

Noise Not a Factor

The suggestions of some designers that ball and roller bearings cannot be applied to crankshafts because of the noise set up is without foundation. As a matter of fact, it is just as desirable to have the back axle and the gear box quiet when running on high gear as it is to have a quiet engine; yet ball and roller bearings are universal in these important parts.

As regards compactness of design, the roller bearing scores over all others. Fig. 5 is a section through the crankshaft of an engine designed by the writer for heavy and continuous duty, and is of the two-cylinder horizontally opposed type. The main drive is taken through the reduction gearing to the camshaft and all bearings are of the roller type. Lubrication is only necessary for the sake of the pistons and cylinders, and a simple "splash" system is perfectly satisfactory. A small rotary gear pump feeds a very small quantity of fresh oil continuously and in accordance with the engine revolutions.

As regards life, the roller bearing is in almost a brand-new condition when friction-type bearings that have been subjected to similar wear are worn out. With well-designed and well-hardened surfaces and accurate rollers well up to their work the bearing is practically everlasting under normal conditions. In one case the writer dismantled an engine for 18,000 miles, and the wear on the shaft did not exceed one-quarter of one-thousandth of an inch, which is very much less than the initial clearance allowed in friction-type bearings.

To one accustomed to the use of the roller bearing it is always a puzzle to understand why the motorist continues to put up with white metal friction-type bearings, with the constant fear of melting from a slight shortage of oil, and the necessity of attention every 10,000 miles. The manufacturer continues to fit this type of bearing because the public continues to tolerate it. A melted bearing is regarded merely as a bit of bad luck instead of being put down to the designer's lack of appreciation of the facilities that modern scientific research has placed ready to his hand.

The hours spent in bedding in new bearings might all be saved if roller bearings were fitted, as the latter are ground dead to size, and grinding is the cheapest method of obtaining interchangeability. A new bearing can be fitted at once if it is a roller, whereas a white-metal bearing requires hours of labor by an expert fitter. It is the friction type of bearing that makes an engine grow old and shaky and leads an owner to sell his car prematurely because of its being worn out. The roller bearing, if properly applied, will outlast the chassis, and, moreover, the bearing will still be without appreciable shake or play. The roller also enables a stiffer crankshaft to be used, and is not susceptible to inferior oils.

The motorist has everything to gain by it—long life, immunity from trouble, ease of starting, and astonishing engine freeness, economy in oil, reduction in upkeep, and, last but not least, a higher market value of his car after a year or two of use.

From the manufacturer's point of view, the only drawback is the initial cost of a little experimenting and changing of designs. After the roller bearing will be found to be considerably cheaper to produce than bearings of the friction type, besides giving greater satisfaction to customers.

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Steam Trucks in Demand

ALTHOUGH the steam truck has never occupied a prominent place in America, it is by far the most used of the really heavy vehicles in England, and it has been recognized as the most economical for some classes of service. Commenting upon future developments *The Commercial Motor*, London, anticipated activity in the steam wagon field after the war:

"The demand for steam wagons will, so far as we can ascertain by 'feelers' which we have put out among our many user friends, be a very much more general one in the future than it was before the war, and especially will this be the case on account of its having been proved that the use of rubber tires upon steam trucks is a commercial advantage. We may incidentally recall our consistent advocacy of the use of rubber tires for these vehicles, by reason of their enabling them to run quietly on paved thoroughfares. Much public objection to steam wagons has undoubtedly been removed by their present-day approach to comparative silence of operation when running, although one still hears objections raised against them in respect of blowing off steam, use of clinkering or firing irons, and noise from certain types of feed pumps, when such vehicles are standing by in yard-spaces for loading near commercial offices.

"The conveyance of heavy loads by steam wagons, where speeds between 5 and 8 m.p.h. are sufficient, with or without trailers, more particularly for certain trades and certain localities, is undoubtedly the cheapest form of haulage in the

country, other than water-carriage, taking all costs into consideration, from point of collection to point of delivery. It is only in respect of Classes A and B of the General Railway Classification that the steam wagon sometimes cannot compete. The projected increases of railway rates may bring some of the goods and materials which are rated in Class B within the limits of economical haulage by steam wagon; practically the whole of those in Class C will soon fall in that category, inclusive of heavy chemicals. There are, of course, additionally, mileage zones to be taken into account before economy can be realized in relation to rail charges plus terminal cartages, for each of the lower railway classifications. It is the steam-wagon industry above all which will benefit from the inevitabe increases of railway rates.

"Steam-wagon practice after the war will be very much on the lines of pre-war days, but we can at least vouch for the existence of new designs by one maker of world-wide repute, to the end that he may succeed in bringing his after-peace types of steam wagons to the best running advantage within the contemplated several weight-and-speed classifications of the new regulations which are due this year."

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Alcohol Fuel for Britain

HAVING regard to the revived interest in industrial alcohol, the following editorial comment from *The Engineer*, London, is interesting:

"Among the many Imperial questions that will have to be dealt with in the near future is that of the supply of cheap industrial alcohol. It may be thought that this is purely a national matter, and that each part of the Empire may well be allowed to settle it to its own satisfaction. On further consideration, however, it will be seen that so easy a solution is not practicable. It is, for example, readily conceivable that one part of the Empire might desire to import alcohol from another part, and unless a common agreement were come to grave difficulties would hamper the trade. In probably no part of the Empire would greater resistance to a change from the present restriction be found than in Great Britain itself, and yet Great Britain would be the largest purchaser from foreign sources.

Alcohol Must Be Developed as Fuel

"The reasons of this resistance are due to a system of making and of controlling the supplies of alcohol that have been developed for the purposes of excise in the course of years, and have acquired an amount of inertia that it will take very strong forces to overcome. But we say, without hesitation, they ought to be, nay must be, overcome. Alcohol is one of those fuels that can be produced in any part of the world, and produced at a price far less than that of imported mineral oils. Moreover, it provides a means of turning to a useful purpose millions of tons of vegetable refuse now burnt in the raw state, with no advantage to the community.

"Besides the inertia of 'excise,' the only thing that has stood in its way is the question of its complete and perfect denaturing. It must be made impotable, and by means which cannot be readily removed by redistillation. The difficulty is not insurmountable, and before now would have been finally solved by the Alcohol Motor Fuel Committee had not the war brought the work well begun to a sudden end. But it has only been delayed, and we hear with keen satisfaction that the Advisory Council of Science and Industry of Australia has the subject on its agenda, and is considering the necessary steps to encourage the production and use of alcohol fuel for power purposes in the Antipodes.

"The construction of an alcohol engine, we need scarcely say at this time of day, presents little difficulty. Indeed, several British firms list engines provided with a special carbureter, and arranged for rather high compression, which work perfectly with alcohol. The only thing that has stood in the path of progress in this direction is the fact that excise restrictions make the price of the fuel too high, and that, we may hope, is a matter that will be put right in the general settling up of industrial problems after the war. This end will be more quickly reached if all parts of the Empire work in harmony, and we venture to suggest to the Australian Advisory Council of Science and Industry, and to the Alcohol Motor Fuel Committee, that they should collaborate to this end and seek also the assistance of the Department of Industrial and Scientific Research in the examination of some of the problems involved. It needs some such combined action to overcome the dead weight of opposition that has, so far, resisted an obviously valuable reform."

—

Tractor Ability in Different Soils

THE house organ of the International Harvester Co. gives the following on resistance of different soils to the plow:

"Bearing the point in mind that a tractor can pull a certain number of pounds at the drawbar, one can understand from the varying soil conditions found on different farms that the number of plows a tractor will pull varies with the kind of soil. By tests it has been found that the draft per square inch of furrow cross section varies in different soils as follows:

	Lb. per Sq. In.		Lb. per Sq. In.
In sandy soil	2 to 3	In clover sod	7
In corn stubble	3	In clay soil	8
In wheat bubble	4	In prairie soil	15
In blue grass sod	6	In gumbo soil	20

"From the above table, it can be readily seen how foolish it would be for a tractor company to guarantee its tractors to pull the same number of plows 'anywhere.'

"What the tractor buyer should do always is to match up his soil conditions with the drawbar pull of the tractors he has under consideration and calculate definitely how many plows he can expect the tractor to pull in his soil, and at the depth he wishes to plow.

"To figure the number of plow bottoms with the above table is simple. Suppose a man is considering the purchase of an 8-16 tractor, which has a drawbar rating of 1500 lb. at a 2-mile speed. Suppose the most difficult plowing this man would ever have upon his farm is in clover sod, which requires a draft of 7 lb. per square inch in furrow cross section. Plowing 6 in. deep, a 14-in. plow bottom has a total of 84 sq. in., and at 7 lb. per square inch, the total pull required for a plow bottom is 588 lb. Dividing the drawbar pull of the tractor, or 1500 lb., by 588 lb., we find that this tractor will pull approximately 2.5 plow bottoms. Illustrating this calculation by formula, we have—

$$\frac{1500\ (\text{Tractor drawbar pull})}{14\ (\text{size of plow}) \times 6\ (\text{depth of plowing}) \times 7\ (\text{draft per square in.})} = 2.5\ (\text{the number of plows to be pulled})$$

"According to the above calculations, this 8-16 tractor can safely be depended upon to pull two 14-in. plows in clover sod of average soil texture.

"If every tractor buyer will take these various factors into consideration when he goes to market for a tractor, he will be safeguarding himself against dissatisfaction later, because he is then selecting a tractor on the actual basis of what he expects it to do."

—

Truck Body Specifications

(*Continued from page* 1095)

manlike manner. Covers to be subject to the usual inspection.

Painting

17. PAINTING: The bodies must be painted all over with three coats of paint of the following composition, each coat of paint being permitted to thoroughly dry before applying the succeeding coat:

6 lb. best quality White Lead, ground in raw linseed oil,
1 lb. Raw Umber,
1 pt. Turpentine,
½ pt. Japan Dryer,
1 qt. Raw Linseed Oil.

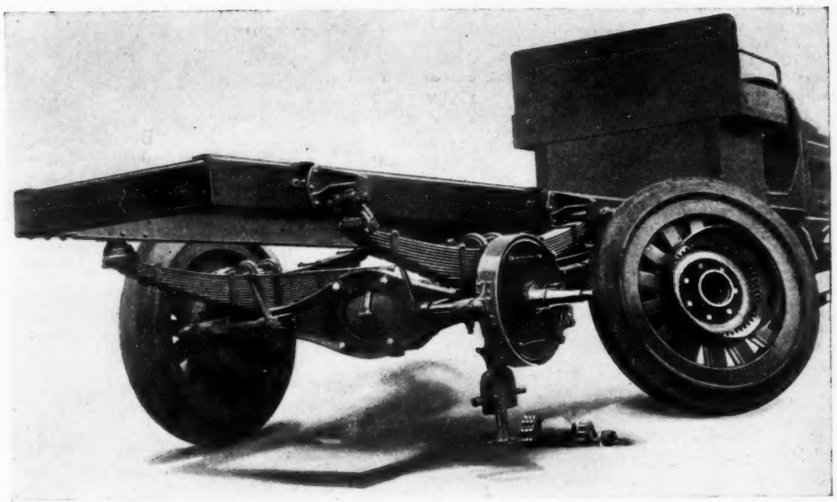
18. All finished woodwork and all iron and steel must be given one good coat of lead and oil, and permitted to thoroughly dry before assembling.

2-Ton Stewart Truck Is Ready

Only Nine Grease Cups Used—Design Is Conventional

PURSUING its policy of enlarging its truck line to include a complete range of vehicle capacities, the Stewart Motor Corp., Buffalo, N. Y., has brought out a 2-ton capacity chassis, known as Model 7. The company has followed a policy of building a single light delivery model, but this year, finding that the demands of dealers were for a complete line of trucks, the range of models has been expanded, until there are now four—of 1500 lb., 1-ton, 1½-ton and 2-ton capacities.

The design of the new 2-ton truck follows along conservative lines, but possesses some features which are distinctive. One of these is the reduction of grease cups to nine on account of the wide use of oil-less bearings. The latter are employed throughout in the springs, spring shackles, brake countershafts and wherever else possible. This is the Nigrum bearing, made by the Bound Brook Oil-less Bearing Co.



Rear of Stewart 2-ton truck chassis, giving an idea of the substantial construction characterizing the vehicle. Note internal gear drive

The truck is assembled from standard units, the engine being a Buda OU model, 4⅛ by 5½-in., which is an L-head four. It has Berling magneto ignition, and the carbureter is 1¼-in. Zenith, equipped with an engine-driven governor. The radiator is an armored tubular type, with a false front, having cast top, bottom and side members.

The engine, clutch and gearbox are mounted as a unit power plant, the drive being taken through a ten-plate Fuller clutch to a three-speed selective gearbox, in which the shafts are carried on double-row annular bearings. The gears are nickel steel and the shafts chrome-nickel steel. From the gearbox the drive is taken through a three-joint tubular driveshaft with a center-joint support mounted on a cross member and supported by self-aligning ball bearings. The rear axle is a Celfor internal-gear driven unit. The load carrying member, or dead rear axle, is set behind the live axle. The total reduction provided is 9 to 1.

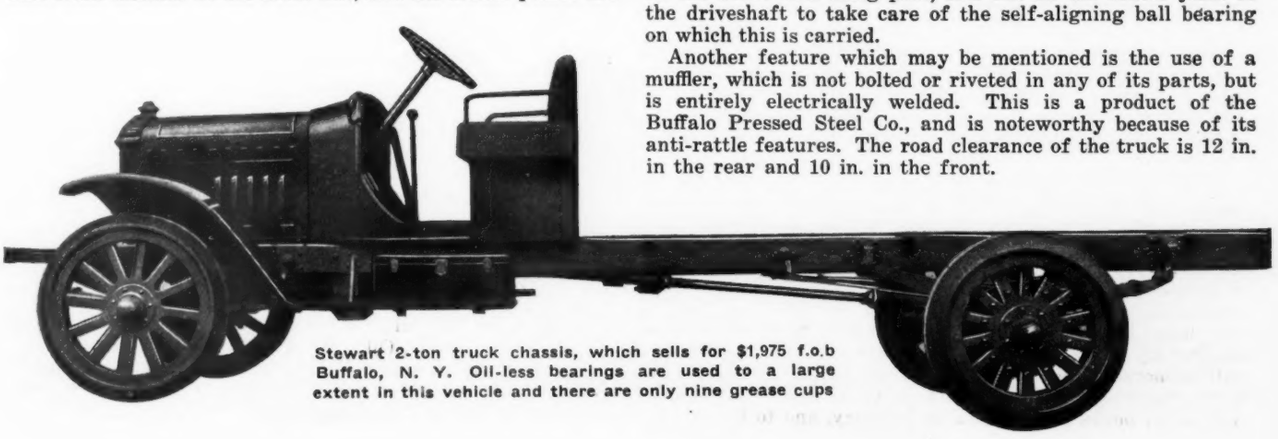
One of the features of the truck is the straight, parallel frame members, which are 32 in. outside to outside. This dimension is a standard on the entire Stewart line. The side members, of course, vary in dimensions according to the capacities of the trucks. The 2-ton frame is 5⅞ in. deep, 2½ in. wide, and made from ¼-in. stock. There is a removable cross member at the front end, and the corner points are heavily gusseted with 7/16 in. rivets. The front axle is a drop-forged I-beam with 1¾ in. spindles provided with Bower roller bearings.

Both the drive and torque are taken through the rear springs. These are bushed with oil-less bearings and are 54 in. long and 3 in. wide. The front springs are 41 in. long and 2½ in. wide. The wheels are 34-in. wood, having semi-round spokes, the front wheels having fourteen spokes 2 in. in diameter and the rear fourteen spokes 2½ in. in diameter. The tire equipment is 34 by 4-in. Swinehart pressed-on for the front and 34 by 7-in. for rear. At an extra cost of $25 4-in. dual rears are provided.

This capacity of truck is capable of a wide variety of uses, and this particular chassis model is suitable for 10, 11, or 12 ft. bodies, the wheelbase being 156 in. It is completely equipped with front bumper, two side and one rear oil lamps, tool kit, tool box on runningboard, mechanical horn, driver's seat, 16-gal. capacity gasoline tank and pressed-steel fenders. It sells for $1,975 f.o.b. Buffalo in lead and $20 extra painted.

In view of the extensive use of the oil-less bearings, it is interesting to note where it has been found necessary to use grease cups. As stated, there are nine of these, and two are on the rear axle on the outer spur gear shaft bearings, two on the rear axle brake shafts for the control brakes, two on the pedal lever shaft on the transmission bell housing, two on the front axle King pins, and one on the center joint of the driveshaft to take care of the self-aligning ball bearing on which this is carried.

Another feature which may be mentioned is the use of a muffler, which is not bolted or riveted in any of its parts, but is entirely electrically welded. This is a product of the Buffalo Pressed Steel Co., and is noteworthy because of its anti-rattle features. The road clearance of the truck is 12 in. in the rear and 10 in. in the front.



Stewart 2-ton truck chassis, which sells for $1,975 f.o.b Buffalo, N. Y. Oil-less bearings are used to a large extent in this vehicle and there are only nine grease cups

Automobile Calendar

ASSOCIATIONS AND CLUBS

Sept. 12-14—Atlantic City, N. J., Motor and Accessory Manufacturers, Mid - Season Meeting.

Sept. 25-28—Pittsburgh, National Assn. of Purchasing Agents, Convention.

CONTESTS

1917

June 16—Chicago, Ill., Speedway Race.

June 23 — Cincinnati, Ohio, Speedway Race.

July 4—Omaha, Neb., Speedway Race, Championship.

July 4—Uniontown, Pa., Speedway Race.

July 4—Tacoma, Wash., Speedway Race.

July 4—Visalia, Cal., Road Race.

July 4—Spokane, Wash., Track Race.

July 4—Benton Harbor, Mich., Track Race.

July 14—Rochester, N. Y., Hillclimb.

July 15—Missoula, Mont., Track Race.

July 17-19—Buffalo, N. Y., Intercity Reliability.

July 22—Anaconda, Mont., Track Race.

July 29—Great Falls, Mont., Track Race.

Aug. 5—Billings, Mont., Track Race.

Aug. 17—Flemington, N. J., Track Race.

Sept. 3—Uniontown, Pa., Speedway Race.

Sept. 3—Cincinnati, O., Speedway Race, Championship.

Sept. 6—Red Bank, N. J., Track Race.

Sept. 8—Hillclimb, Pike's Peak, for stripped stock chassis.

Sept. 15—Providence, R. I., Speedway Race, Championship.

Sept. 22—Allentown, Pa., Track Race.

Sept. 28—Trenton, N. J., Track Race.

Sept. 29—New York Speedway Race, Championship.

Oct. 6—Danbury, Conn., Track Race.

Oct. 6—Uniontown, Pa., Speedway Race.

Oct. 13—Richmond, Va., Track Race.

Oct. 13—Chicago Speedway Race, Championship.

Oct. 27 — New York Speedway Race.

SHOWS

June 9-16—Detroit Used Car Show, Crosstown Garage, Detroit Auto Dealers' Assn.

June 20-27 — Montreal, Que., Used Car Show, Coliseum, Montreal Automobile Trade Assn.

Aug. 6-10—Fremont, Neb., General Tractor Demonstration.

Sept. 2-9—Spokane, Wash., Interstate Fair.

Sept. 9-15 — Milwaukee Show, State Park Fair, West Allis.

Sept. 9-15 — Milwaukee, Wis., Fall Show, Wisconsin State Fair, West Allis, Milwaukee Automobile Dealers.

Oct. 13-28—Dallas, Tex., Dallas Automobile & Accessory Dealers' Assn. State Fair.

S. A. E. Calendar

Midsummer Meeting

June 25-26—Washington, D. C.
June 26—Informal dinner, New Willard Hotel.

Standard Division Meetings

JUNE

8—Lighting in joint session with a committee from the Illum. Eng. Soc., New York.
8—Transmission, Detroit.
14—Electric Vehicle, New York.
19—Aeronautic, Washington.
20—Data Sheet, New York.
25—Standards Committee, Washington.

Section Meetings

JUNE

15—Cleveland. Paper by E. H. Sherbondy of the Peerless Motor Car Co. entitled "Aviation Engines, with Particular Reference to the Benz and Mercedes Types."

Engineering Calendar

American Railway Master Mechanics' Assn.
American Institute of Electrical Engineers.
Master Builders' Assn.
American Society of Heating and Ventilating Engineers.
Association Iron and Steel Electrical Engineers.
Mining and Metallurgical Society of America.
Society of Automotive Engineers.
Illuminating Engineering Society.
National Electric Light Assn.
National Gas Engine Assn.
American Society for Testing Materials.
American Institute of Metals.
American Foundrymen's Assn.
Society Naval Architects and Marine Engineers.

JUNE

8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

9—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Michigan section at Detroit.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

13-14-15 — Amer. Ry. Master Mech. Assn. convention, Greek Temple, Atlantic City, N. J., Hdqrs. Marlborough-Blenheim Hotel.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

15—Illum. Eng. Soc. Pittsburgh section, Office Building, Lighting and Inspection Trip through City and County Building. Mr. S. G. Hibben.

16—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

18-19-20 — Master Car Bldrs. Assn. convention. Greek Temple, Atlantic City, N. J. Hdqrs. Marlborough-Blenheim Hotel.

20-22—Amer. Inst. Chem. Engrs., Ninth Semi-Annual Meeting at Buffalo.

21—Mining & Met. Soc. of Amer. New York section monthly meeting at Engrs. Club.

26-30—Amer. Soc. for Test Mat. annual meeting Atlantic City, Hotel Traymore. Business meetings, reception and golf tournament.

JULY

7—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass section at Boston.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

14—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

16—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

AUGUST

4—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

11—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

20—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

21—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

SEPTEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

10-14—Assn. Iron & Steel Elec. Engrs. annual convention at Phila.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

20—Mining & Met. Soc. of Amer. monthly meeting N. Y. section at Engrs. Club.

24—Amer. Inst. Metals at Boston.

24—Amer. Fdry. Assn. annual meeting at Boston.

OCTOBER

6—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

13—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

15—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

17-18-19—Amer. Gas. Inst. at Washington, D. C.

18—Mining & Met. Soc. Amer. monthly meeting New York section Engrs. Club.

20—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

NOVEMBER

3—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penna. section at Phila.

9—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

10—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

12—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mass. section at Boston.

15—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.

15-16—Soc. Naval Arch. & Marine Engrs. annual meeting.

17—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

19—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

DECEMBER

1—Assn. Iron & Steel Elec. Engrs. monthly meeting Phila. section.

8—Assn. Iron & Steel Elec. Engrs. monthly meeting Cleveland section.

10—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ill. section at Chicago.

11—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Mich. section at Detroit.

13—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Penn. section at Phila.

14—Amer. Soc. Heat. & Vent. Engrs. monthly meeting Ohio section at Cleveland.

15—Assn. Iron & Steel Elec. Engrs. monthly meeting Pittsburgh section.

17—Amer. Soc. Heat. & Vent. Engrs. monthly meeting New York section.

20—Mining & Met. Soc. Amer. monthly meeting New York section at Engrs. Club.